MITSUBISHI Electronic Multi-Measuring Instrument

Types

ME110SSR
ME110SSR-4AP
ME110SSR-4APH
ME110SSR-4A2P
ME110SSR-C
ME110SSR-CH
ME110SSR-MB

User's Manual: Detailed Edition

- Before operating the instrument, you should first read thoroughly this operation manual for safe operation and optimized performance of the product.
  Deliver this user's manual to the end user.

Check on your delivery

Check the following point as soon as you receive Mitsubishi Electronic Multi-Measuring Instrument :

- The package is in good condition.
- The product has not been damaged during transit.
- The product corresponds to your order specifications.
- This product has the following accessories.

Parts name	Quantity	Specifications
User's Manual (Simplified)	1	A3 size
Attaching nuts	2	M5 belleville spring nuts (contained in a bag)

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Safety Precaution

(Always read these instructions before using this equipment)

For personnel and product safety please read the contents of these operating instructions carefully before using.

Please save this manual to make it accessible when required and always forward it to the end user.

⚠CAUTION Indicates that incorrect handling may cause hazardous conditions. Always follow the instructions because they are important to personal safety. Otherwise, it could result in electric shock, fire, erroneous operation, and damage of the instrument.

■Normal service conditions

⚠CAUTION

Use the instrument in an environment that meets the Normal service conditions as following points:

- Ambient temperature :-5 to 50°C, average day temperature: 35°C or lower
- Humidity :30~85%RH, non condensing.
- Altitude: 1000m or less
- Pollution Degree : 2
- Atmosphere without corrosive gas, dust, salt, oil mist.
- A place without excessive shocks or vibration.
- Do not expose to rain and water drips.
- Do not expose to direct sunlight.
- An area where no pieces of metal and no inductive substances disperse.
- Do not expose to strong electromagnetic field and ambient noises.

■Installation instructions

⚠CAUTION

- This instrument should be installed and used by a qualified electrician.
- The instrument must not be powered and used until its definitive assembly on the cabinet's door.
- Verify the following points;

  □ Auxiliary power supply and Measuring ratings

Auxiliary power supply		100-240V AC$^{+10}_{-15}$%(50-60Hz) 10VA 100V DC$^{+40}_{-25}$% 6W
Ratings	Voltage	277V AC phase-neutral / 480V AC phase-phase
	Current	5A or 1A (via current transformer)
	Frequency	50/60Hz

  □ Current circuits, C1, C2 and C3 are Measurement category Ⅰ.

  □ Voltage circuits, P1, P2 and P3 are Measurement category Ⅲ.

- The instrument is to be mounted on panel. All connections should be kept inside the cabinet.
- Tighten the terminal screws with the specified torque and use the suitable pressure connectors and suitable wire size. (see page 72)
- When wiring in the instrument, be sure that it is done correctly by checking the instrument 's wiring diagrams. (see pages 74 to 78)
- Be sure there are no foreign substances such as sawdust or wiring debris inside the instrument.
- Do not drop this instrument from high place. If you drop it and the display is cracked, do not touch the liquid crystal and get it in your mouth. If touching the liquid crystal, wash it away at once.
- In order to prevent invasion of noise, do not bunch the control wires or communication cables with the main circuit or power wire, or install them close to each other. The distance between communicational signal lines, input signal lines and power lines, and high voltage lines when running parallel to each other are shown below.

Conditions	Length
Below 600V, or 600A power lines	30cm or more
Other power lines	60cm or more

■Operation instructions

⚠CAUTION
●When the external terminals are connected to the external equipments, the instrument and the external equipments must not be powered and used until its definitive assembly on the cabinet's door. ●The rating of the terminal of the external equipment should satisfy the rating of the external terminal of this instrument. (See Specifications.)

■Maintenance instructions

⚠CAUTION
●Do not touch the terminals while all the circuits connected to this instrument are alive. ●Do not disassemble or modify the instrument. ●Do not allow a chemical dust cloth to be in contact with the instrument for a long time, or do not wipe it with benzene, thinner, alcohol.

- ●Wipe dirt on surface with a soft dry cloth.
- ●Check the following points,
  - ☐ Condition of the appearance
  - ☐ Condition of the Display
  - ☐ Unusual sound, a smell, and generation of heat
  - ☐ Condition of the wiring and the attachment

■Storage conditions

- ●Ambient temperature: -20 to 60°C, average day temperature: 35°C or lower
- ●Humidity range 30~85%RH, non condensing.
- ●Atmosphere without corrosive gas, dust, salt, oil mist.
- ●A place without excessive shocks or vibration.
- ●Do not expose to rain and water drips.
- ●Do not expose to direct sunlight.
- ●An area where no pieces of metal and no inductive substances disperse.

■Disposal

- ●When disposing of this product , treat it as industrial waste.
- ●The battery is not used for this product.

■Guarantee

The period of guarantee is for 1 year from the sale date, except in the case that the failure has been caused by bad handling of the product, provided that it has been installed according to the manufacture's instructions.

EMC DIRECTIVE INSTRUCTION

This section summarizes the precautions on conformance to the EMC Directive of the cabinet constructed using this Instrument.
However, the method of conformance to the EMC Directive and the judgment on whether or not the cabinet conforms to the EMC Directive has to be determined finally by the manufacturer.

1. EMC Standards

- EN 61326-1:2006
- EN 61000-3-2:2006/A1:2009/A2:2009
- EN 61000-3-3:2008

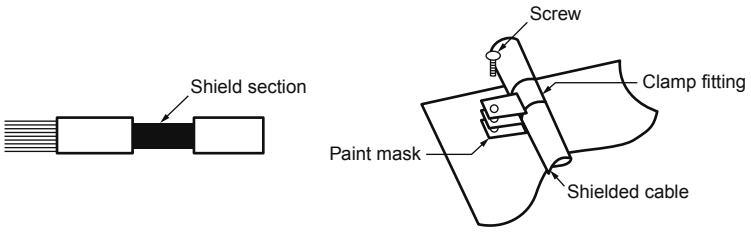
2. Installation (EMC directive)

The instrument is to be mounted on panel of a cabinet.
Therefore, the construction of a cabinet is important not only for safety but also for EMC.
The instrument is examined by the following conditions.

- Use a conductive cabinet.
- Six faces of a cabinet have to be ensured conductivity for each other.
- A cabinet has to be connected to earth by a thick wire of low impedance.
- Holes on faces of cabinet have to be 10 cm or less in diameter.
- The terminals for protective earth and functional earth have to be connected to earth by a thick wire of low impedance. (A terminal for protective earth is important not only for safety but also for EMC.)

⏚	Protective earth: Maintains the safety of the instrument and improves the noise resistance.
⏚	Functional earth: Improves the noise resistance.

- All connections should be kept inside the cabinet.
- Wirings outside the cabinet have to be used with the shielded cable.
  The following diagram shows how to provide good contact of the shielded cable.
  ☐ Remove part of the outer cover.
  ☐ Remove part of the paint musk on the cabinet.
  ☐ Connect those parts with the clamp.



Features

This instrument measures the load status by inputting the secondary side of the VT and CT, and displays various measurement values.
In addition, telemonitoring can be done by a variegated output function.

■Various measurement parameters

Phase wire system		3P4W	3P3W,1P3W	1P2W
Current	A	A1,A2,A3,AN,Aavg	A1,A2,A3	A1
Current Demand	DA	DA1,DA2,DA3,DAN,DAavg	DA1,DA2,DA3	DA1
Voltage	V	V12,V23,V31,Vavg(L-L), V1N,V2N,V3N,Vavg(L-N)	V12,V23,V31	V12
Active Power	W	ΣW,W1,W2,W3	ΣW	ΣW
Active Demand Power	DW	ΣDW,DW1,DW2,DW3	ΣDW	ΣDW
Reactive Power	var	Σvar,var1,var2,var3	Σvar	Σvar
Apparent Power	VA	ΣVA,VA1,VA2,VA3	-	-
Power Factor	cosφ	Σcosφ,cosφ1,cosφ2,cosφ3	Σcosφ	Σcosφ
Frequency	Hz	Hz		
Active Energy	Wh	Import, Export		
Reactive Energy	varh	Import lag, Import lead, Export lag, Export lead		
Harmonic Current	HI	HI1, HI2, HI3, HIN	HI1,HI3	HI1
		THD,h1...h13(without even number) RMS value and Distortion ratio(max.100%)		
Harmonic Voltage	HV	HV1N,HV2N,HV3N	HV12,HV23	HV12
		THD,h1...h13(without even number) RMS value and Distortion ratio(max.20%)		

Referred to as follows in this manual:
average value : avg
three phase total RMS : Σ
phase to phase : L-L
phase to neutral : L-N

ex) average value of current : A_{avg}
Three phase active power : ΣW
1-phase to 2-phase voltage : V12
1-phase to neutral voltage : V1N

■4 measurement items appear on one display

By combination of bar graph and digital 3-stage display, 4 measurement items can be displayed on one display. For example, voltage, current, power factor and active power can be displayed at the same time.

■RS485 interface, ModBus RTU(ME110SSR-MB)

■CC-Link communication

Measured values can be sent to PC or PLC via CC-Link communications. (ME110SSR-C,-CH)

■Analog 4 outputs + pulse output + alarm relay output (ME110SSR-4APH)

For example, the analog outputs of voltage, current, active power, and power factor, the pulse output of active energy, and the alarm output of THD can be performed by one unit.

■Harmonics

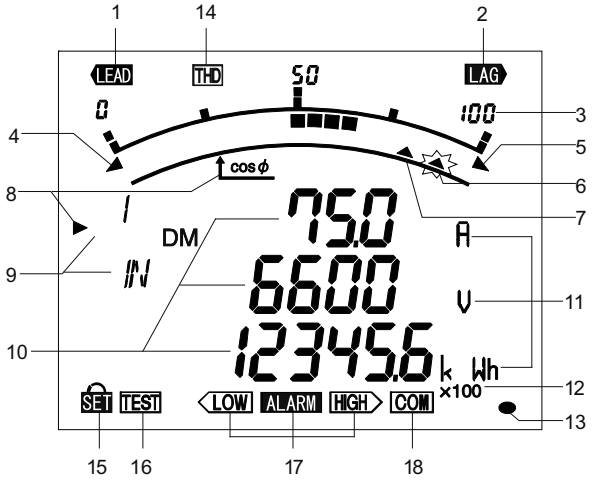
It is equipped with harmonics current and harmonics voltage measurement function as standard one.

■Back light auto off function

It is equipped with energy saving mode function where the back light is turned off when there is no key operation for 5 minutes.

Operation 1. Display and Button Functions of Each Part

■ Display



Note: The above display is an example for explanation.

No.	Segment Name	Description
1	LEAD status	Shows direction power factor or reactive power on bar graph.
2	LAG status	Turns on at the additional display of reactive energy.
3	Scale of the bar graph	Shows the scales at the bar graph.
4	Under scale input	Turns on when measuring values fall below the minimum scale.
5	Over scale input	Turns on when measuring values exceed the maximum scale.
6	Alarm indicator	When upper/lower limit alarm set, flickers at the limit setting value.
7	Index indicator	When set, turns on at the index indicator setting value.
8	Bar graph status	Shows the item displayed on the bar graph. When the item is the same as a digital displayed item,indicated with " ▶ ", otherwise indicated with " ⮤ "
9	Digital status	Phase status, "123N" , "MAX/MIN",demand etc. displayed.
10	Digital display	Measured values displayed in digital.
11	Units	Units of measuring value displayed.
12	Multiplying factor	Indicates the multiplying factor for calculating energy.
13	Metering status	Flickers when counting active energy.(Note.1)
14	Harmonics	Turns on when harmonics displayed.
15	Setup mode status	Turns on at setting mode. Flickers at setting value confirmation mode.
16	Test mode status	Turns on at the test mode.
17	Upper/lower limit alarm status	Flickers when upper/lower limit alarm is generated.
18	Communication status	The following are displayed for models with a transmission function.

Model	On	Blinking	Off
ME110SSR-C ME110SSR-CH	Normal	・CC-Link compatible version mismatch ・Hardware error	Hardware error
ME110SSR-MB	Normal	・Communication error (Such as wrong address)	Hardware error

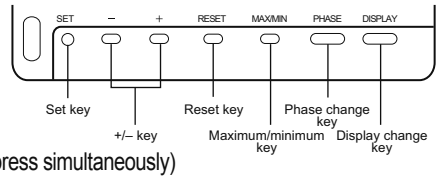
* Products other than above don't illuminate.

Note 1. The blinking cycle is constant regardless of the size of the measured input.

Operation 1. Display and Button Functions of Each Part

■ Functions of operation buttons

The operation button have various functions according to how they are pressed down.



Meaning of code: ○ (Press), □ (press over 1 second), ◎ (press over 2 seconds), —— (press simultaneously)

Mode \ Operation		Key name: SET	–	+	RESET	Max/ Min	PHASE	DISPLAY	Function	
Operation mode	BASIC							○	Display changes.	
							○		Phase changes.	
						○			Mode changes to the max./min. display and the instantaneous display	
			○	○					The item expressed with the bar graph is changed.	
									Harmonics number changes when harmonics displayed.	
								◎	Displays change cyclically. (Refer to page 48)	
							◎		Phases change cyclically. (Refer to page 48)	
			◎——◎						The counting values of three digits of low rank are displayed. After pressing once again, the display returns. (Refer to page 51)	
	Special				◎				Maximum values and minimum values on the display are reset to the present value.	Only available for maximum/minimum value screen
				◎	◎				All of the Maximum values and minimum values are reset to the present value.	
		◎			◎		◎		All of the counting values are zero reset.	
					◎				The operation time is zero veset (Screen operation time only)	
					○				An alarm condition is canceled. (Screen element is canceled)	Available only when manual cancelation is set
					◎				All alarm conditions are canceled. (Element is canceled for all screens)	
					◎				The latching data of digital input on the display is canceled. (Available only for contact point input screen)	
	Mode Switch	◎							The display of Set value confirmation mode appears.	
		◎			◎				The display of Setup mode appears.	
Set-up mode/ Set value confirmation mode	Setting Operation	○							The set-up items are saved, and set-up item is changed to next item.	
								○	Back to the previous item.	
			○ □	○ □					The values of set-up is changed. (If it presses for 1 sec or more fast forward or fast return.)	
		□							Back to the Setup display.	
	Special Operation				◎				Returns from infrared mode to operation mode (Available only for infrared mode)	
						□——□			Back to the Setup display.	
					◎		◎		Returns set contents to the default settings (Only effective in CANCEL display) (Refer to page 35)	

Note: While the back light is off, if the operation key is pressed, the back light is always lit. If the operation button is pressed once again, the function in the above table appears.

Note: When Wh and varh are cleared to zero, the CO_2 emission value is also cleared.

⚠**CAUTION**	● If the function of “maximum value and minimum value reset” and “Wh, varh zero reset” are done,data will be lost. If this data is needed,please record the data before the reset operation. ● If the function of “meter restart” is done, the entire measurement(measure-ment display, alarm, analog output, pulse) stops.

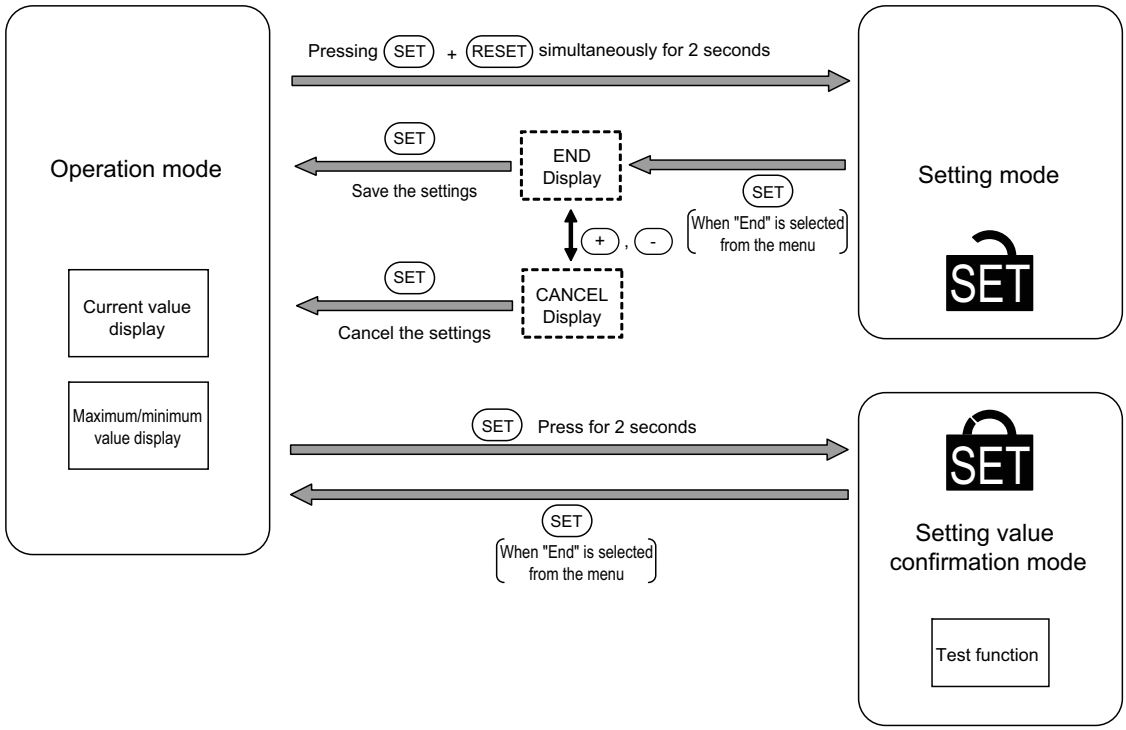
2. Function Modes

The following function modes are available for this Multi-Measuring instrument. Operation mode is displayed after auxiliary power turns on. It is then possible to switch to the desired mode.

Mode	Description	Reference Pages
Operation Mode	This mode is for displaying each measured value using digital numerical values and bar graphs. Operation mode contains "Current Value Display" that displays the current value, and "Maximum/Minimum Value Display" that displays old maximum/ minimum values. In addition, for each display, the cyclic display function can be used to switch between the screens every 5 seconds.	P. 47 to P. 57
Setting mode	This mode is for changing the setting values related to measurement and output functions. The following special operations can be executed from the "CANCEL Display" for changing/cancelling setting values. ● The instrument is reset. ● Reset the settings to the factory defaults (Note)	P. 12 to P. 32 P. 35 to P. 39
Setting value confirmation mode	This mode is for confirming the setting values for each setting item. (In this mode, settings cannot be changed in order to prevent accidental changing of settings.) This mode contains test functions that can be used for equipment startup. ● Incorrect Wiring Determination Support Display : This displays information such as voltage and current phase angle display for determining improper wiring. ● Analog Output Adjustment : Analog output can be adjusted (zero adjustment and span adjustment). ● Output Test : Analog output can be switched, pulse output can be executed, and alarm contact points can be opened/closed without measurement input (voltage/current). ● Communication Test : Fixed numerical data can be returned without measurement input (voltage/current).	P. 33 and P. 34 P. 40 to P. 46

Note: When the purchased product already has settings, the setting values will not longer be available after this operation.

■ Diagram of Each Mode



3. Settings

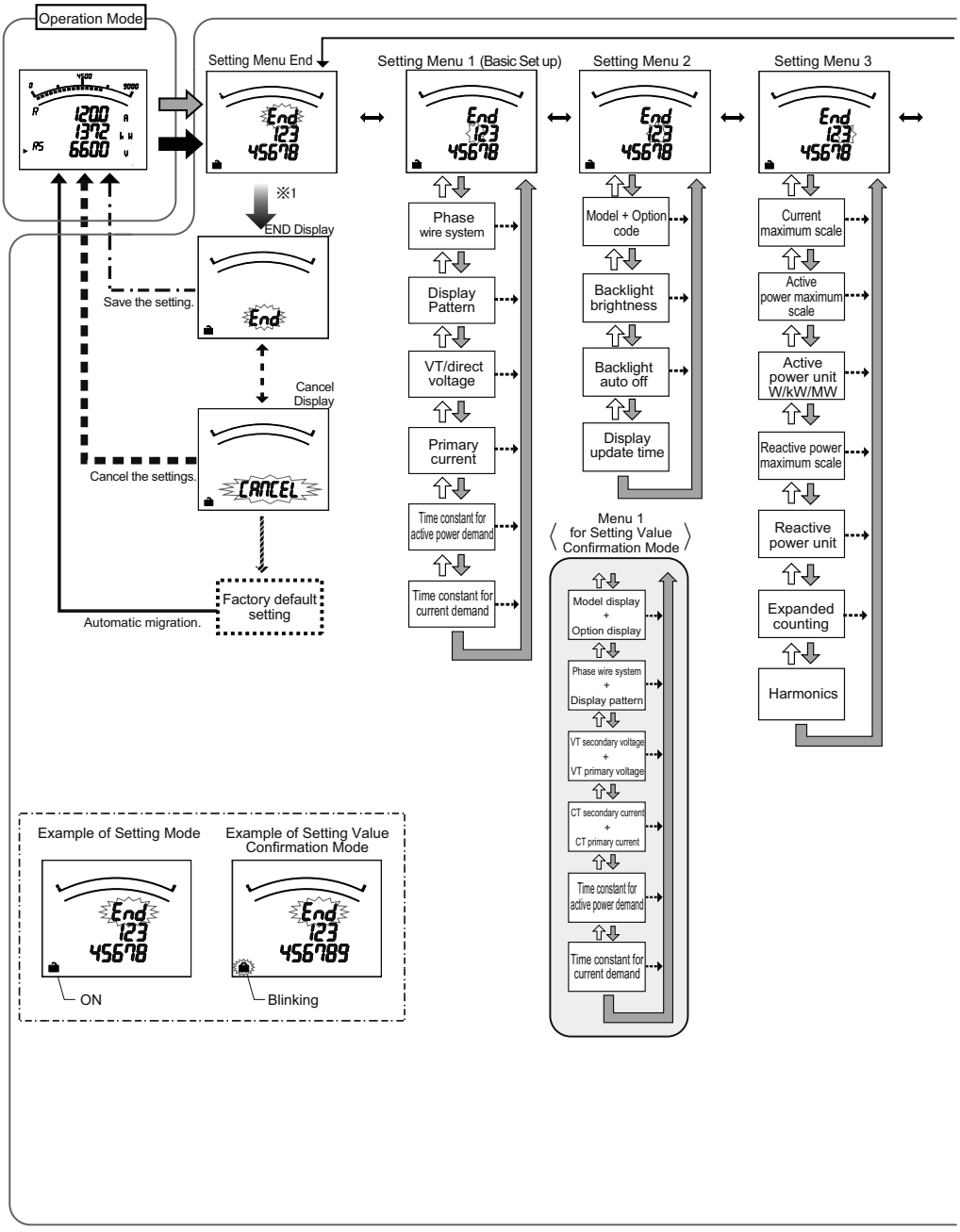
3.1 Setting flow

To measure, it is necessary to use Setting mode to set the phase wire system, VT / direct voltage, and CT primary current.

From Operation mode, move to Setting mode and then set necessary items. Factory default settings will be used for items that you do not set.

Only the settings in Setting menu 1 (basic set-up) are needed for normal use. For more information about the settings, refer to the following pages.

For more information about the factory default settings, refer to the setting table on page 81.



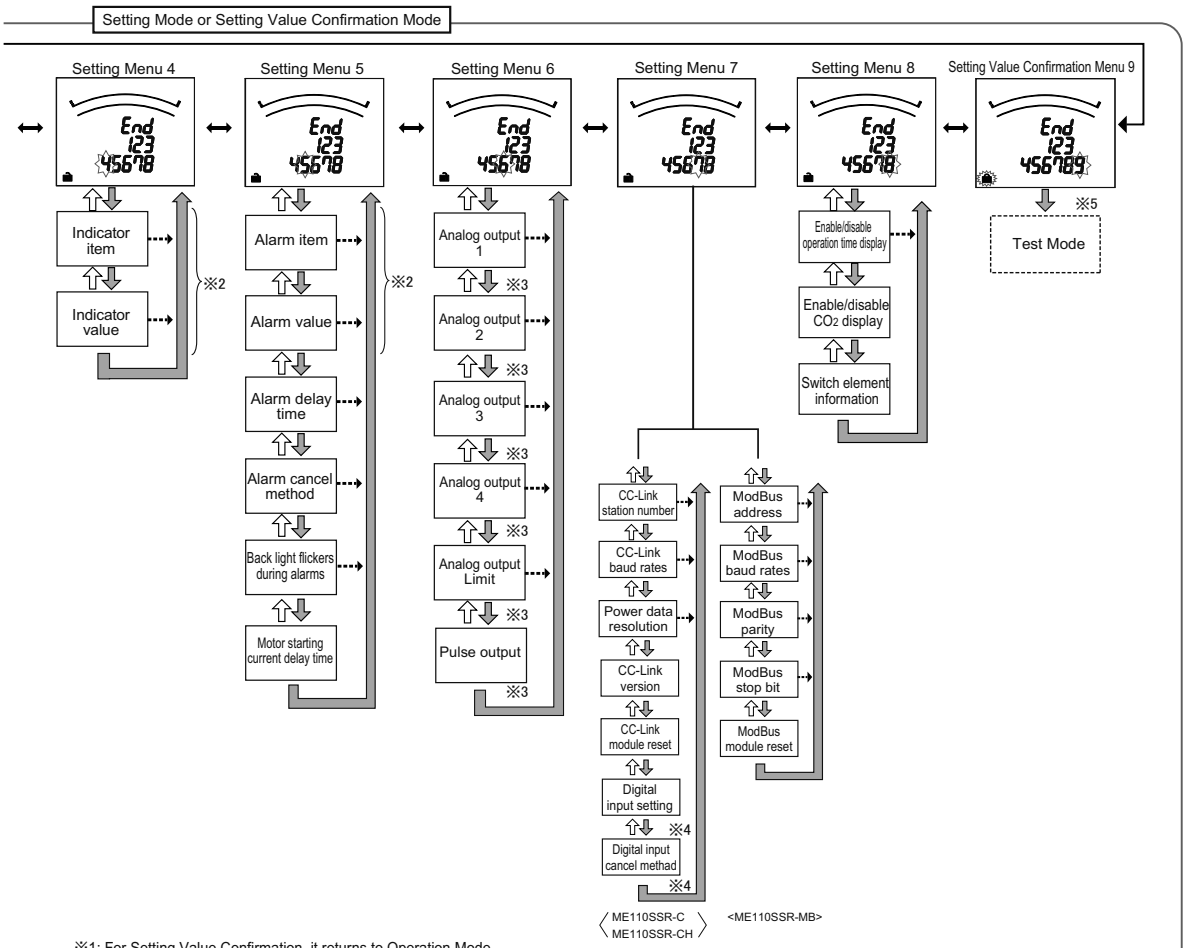
⚠**CAUTION**	Keep in mind that when a setting is changed, the related setting items and measurement data will be reset to the default settings. (Refer to page 35.)

3. Settings

3.1 Setting flow

<Setting Procedure>

① Press (SET) and (RESET) simultaneously for 2 seconds to get in the set-up mode.
② Select a set-up menu number by (+) or (−) .
③ Use the (SET) key to select a set-up menu number.
④ Set each setting item. (Refer to page 14 and later pages.)
⑤ After completion of set-up, select 'End' in the set-up menu and press (SET).
⑥ When the End display appears, press (SET) once again.



※1: For Setting Value Confirmation, it returns to Operation Mode.
※2: Repeat settings for up to 4 elements.
※3: Setting is only possible for ME110SSR-4AP,4APH and -4A2P.
※4: Setting is only possible for ME110SSR-CH.
※5: This is not display in Setting Mode.

Arrow in Figure	Action	Key operation	
⇨	Shift from the operation mode to the set-up mode.	(SET)+(RESET)	Press them simultaneously for 2 seconds.
➡	Shift from the operation mode to the set value confirmation mode.	(SET)	Press it for 2 seconds.
⇔	Select the menu number to set or "End" .	(+) or (−)	Press it several times.
⇨	Get into each setting screen. Shift to the next setting item.	(SET)	Press it.
⇦	Go back to the previous setting item.	(DISPLAY)	Press it.
Omitted in figure	Select a set value.	(+) or (−)	Press it several times.
➡	Shift to the End screen.	(SET)	Press it.
-·→	Memorize the setting contents, and go back to the operation mode.	(SET)	Press it.
⇦	Select "CANCEL."	(+) or (−)	Press it.
■■▶	Cancel the settings.	(SET)	Press it.
------▶	Skip remaining setting items during setting.	(SET)	Press it for 1 second
▨	Set values return to the factory default value.	(RESET)+(PHASE)	Press it for 2 seconds

3. Settings

■ Basic Operations for set-up

Function	Operation	Remarks
Select a set value	Press (+) or (−).	Fast-forward when pressed over 1 sec.
Set-up items are saved	Press (SET).	Set-up item will be cared and shift to the next item.
Go back to the previous setting item	Press (DISPLAY).	The set value for the setting item just before returning is still available.
Skip removing setting items during setting	Press and hold (SET) for 1 sec.	

3.2 Setting Menu 1: Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, and Time constant for Demand

In the operation mode, after pressing (SET) and (RESET) simultaneously for 2 seconds or more, the following operation becomes available.

Setting Menu

DISPLAY SET

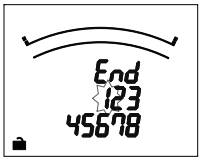
① Phase Wire system

DISPLAY SET

② Display Pattern

DISPLAY SET

Set the setting menu number to “1”.



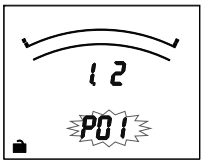
Set the phase wire system.

3P4 : Three-phase 4-wire
2CT 3P3 : Three-phase 3-wire (2CT)
3CT 3P3 : Three-phase 3-wire (3CT)
1N2 1P3 : Single-phase 3-wire (1N2)
1N3 1P3 : Single-phase 3-wire (1N3)
1P2 : Single-phase 2-wire

Supplemental Information:
Underlined portions indicate the default values.
(Same from here.)

Set the display pattern.

The following table shows the measurement elements that can be displayed by each display pattern. (For more details about display patterns, refer to page 62.)In addition, if there is no display pattern that you want from P01 to P13 (P14 and P15), select the special display pattern P00 to configure the screen freely.(For more information about setting the special display pattern P00.)



○ : Displayable at this display setting.
△ : Set at other additional settings.
□ : Select "P00" and set the display order and display position.

(a) For three-phase 4-wire

Display Pattern	Current	N phase current	demand current	N Phase demand Current	Line Voltage	Phase Voltage	Active Power	Active demand Power	Power factor	Reactive power	Frequency	Active Energy	Reactive Energy	Apparent power	Additional Screen (Supplemental) Active Energy (Exported)	Reactive Energy (Special)	Harmonic current	N Phase Harmonic Current	Harmonic voltage	Digital input (DI1 to DI3)	Operation time	CO_2 Emission
P01	○	○			○	○	○		○								△	△	△	△	△	△
P02	○	○			○	○	○		○			○			△		△	△	△	△	△	△
P03	○	○			○	○	○		○	○	○			○			△	△	△	△	△	△
P04	○	○			○	○	○		○	○	○	○	○	○	△	△	△	△	△	△	△	△
P05							○		○	○	○			○			△	△	△	△	△	△
P06	○	○			○	○											△	△	△	△	△	△
P07	○	○			○	○	○										△	△	△	△	△	△
P08	○	○			○	○	○					○			△		△	△	△	△	△	△
P09	○	○	○	○	○	○											△	△	△	△	△	△
P10	○	○	○	○	○	○	○										△	△	△	△	△	△
P11	○	○	○	○	○	○						○			△		△	△	△	△	△	△
P12	○	○	○	○	○	○	○					○			△		△	△	△	△	△	△
P13	○	○			○	○	○		○	○	○	○	○	○	△	△	△	△	△	△	△	△
P00	□	□	□	□	□	□	□	□	□	□	□	□	□	□	△	△	△	△	△	△	△	△

Measurement element on additional screen	Setting item	Reference Pages
Electric energy Power sending / reactive electric energy Special	Set-up Menu 3 ●Electric energy Transmission power display	Page 20
Harmonic current / Harmonic voltage	Set-up Menu 3 ●Harmonics display	Page 20
Contact point input status (DI1 to DI3)	Set-up Menu 7 ●Digital input setting	Page 30
Operation time	Set-up Menu 8 ●Operation time display	Page 32
CO_2 emission	Set-up Menu 8 ●CO_2 emission display	Page 32

3.2 Setting Menu 1: Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, and Time constant for Demand

(b) For other phase wire system except three-phase 4-wire

Display Pattern	Current	demand current	N Phase demand Current	Voltage	Active Power	Active demand Power	Power factor	Reactive power	Frequency	Active Energy	Reactive Energy	Additional Screen (Supplemental)						
												Active Energy (Exported)	Reactive Energy (Special)	Harmonic current	Harmonic voltage	Digital input (DI1 to DI3)	Operation time	CO_2 Emission
P01	○		○	○	○		○							△	△	△	△	△
P02	○		○	○	○		○			○		△		△	△	△	△	△
P03	○		○	○	○		○	○	○					△	△	△	△	△
P04	○		○	○	○		○	○	○	○	○	△	△	△	△	△	△	△
P05				○	○		○	○	○					△	△	△	△	△
P06	○		○											△	△	△	△	△
P07	○		○	○	○									△	△	△	△	△
P08	○		○	○	○					○		△		△	△	△	△	△
P09	○	○	○											△	△	△	△	△
P10	○	○	○	○	○									△	△	△	△	△
P11	○	○	○							○		△		△	△	△	△	△
P12	○	○	○	○	○					○		△		△	△	△	△	△
P13	○		○	○	○		○	○	○	○	○	△	△	△	△	△	△	△
P14	○		○	○	○		○							△	△	△	△	△
P15	○		○	○	○		○			○		△		△	△	△	△	△
P00	□	□	□	□	□	□	□	□	□	□	□	△	△	△	△	△	△	△

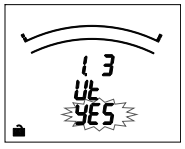
Note: The following settings are required for displaying elements on an additional screen.

Measurement element on additional screen	Setting item	Reference Pages
Active Energy(Exported) / Reactive(Special)	Setting Menu 3 ● Expanded counting	Page 20
Harmonic current / Harmonic voltage	Setting Menu 3 ● Harmonics Display	Page 20
Digital input (DI1 to DI3)	Setting Menu 7 ● Digital input setting	Page 30
Operation time	Setting Menu 8 ● Operation time display	Page 32
CO_2 emission	Setting Menu 8 ● CO_2 emission display	Page 32

When using VT⇒ Select yES, and then press (SET), shift to following (1)

When direct input (without VT) ⇒ Select no, and then press (SET), shift to following (2).

yES ↔ no



<When ① phase wire system is set to single-phase 3-wire>
Use only for direct input.
This set-up will be skipped and the setting starts from ④ Primary Current .
The rating voltage between P1-P2 or P2-P3 is 110V.
It is 220V between P1-P3

③ VT / direct voltage

(1) When using VT

Set the secondary and primary voltages of the VT.

(a) For three-phase, 4-wire

<Secondary Voltage (Phase to phase Voltage) Setting Range>

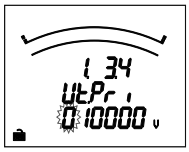
63.5V ↔ 100V ↔ 110V ↔ 115V ↔ 120V

<Primary Voltage (Phase to phase Voltage) Setting>
(Default Value: 200V)

- From top digit, select the value of the flickering digit by ⊕ and ⊖.
- The setting digit can be moved to right by (SET).
- The setting digit can be moved to left by (DISPLAY).
- Setting is available in range from 60 to 750000V.
  - Less than 100V : Upper 2 digits setting
  - Over 100V : Upper 3 digits setting

* Error display (E05) appears when set out of 60 to 750000V range. After that, please press (SET), review the setting value and set it once again.

- Press (SET) at the lowest digit, the setting step will shift to the next one.



DISPLAY SET

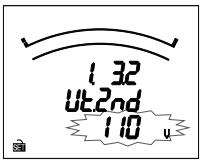
To ④ CT primary current

DISPLAY SET

3.2 Setting Menu 1: Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, and Time constant for Demand

(b) For three-phase 3-wire (2CT, 3CT)
or single-phase 2-wire
<Secondary Voltage Setting Range>

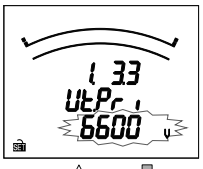
100V ⟷ 110V ⟷ 220V



DISPLAY SET

<Primary Voltage Setting Range>

220V	3300V	15kV	110kV	500kV
440V	3.3kV	16.5kV	132kV	550kV
690V	6600V	22kV	154kV	SP.
1100V	6.6kV	24kV	187kV	
1.1kV	11kV	33kV	220kV	
2200V	13.2kV	66kV	275kV	
2.2kV	13.8kV	77kV	380kV	



DISPLAY SET

Note: If there is no primary voltage in the above that you want to set, select "SP." for a special primary voltage setting.

Setting except "SP.": To ④ CT Primary Current
When setting "SP.": To following "Special Primary Voltage"

"Special Primary Voltage" Settings (Default value: 10,000V)

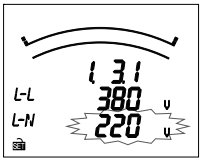
- From top digit, select the value of the flickering digit by ⊕ and ⊖.
- The setting digit can be moved to right by (SET).
- The setting digit can be moved to left by (DISPLAY).
- Setting is available in range from 60 to 750000V.
  Less than 100V : Upper 2 digits setting
  Over 100V : Upper 3 digits setting
  * Error display (E05) appears when set out of 60 to 750000V range. After that, please press (SET), review the setting value and set it once again.
- Press (SET) at the lowest digit, the setting step will shift to the next one.

DISPLAY SET

To ④CT primary current

---

(2) For direct input (without VT)
Set the direct voltage.



(a) For three-phase 4-wire
(phase to neutral voltage / phase to phase voltage)

63.5/110V ⟷ 100V/173V ⟷ 110V/190V ⟷ 220V/380V ⟷ 240V/415V ⟷ 254V/440V ⟷ 277V/480V

(b) For three-phase 3-wire (2CT, 3CT) or single-phase 2-wire

110V ⟷ 220V

3.2 Setting Menu 1: Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, and Time constant for Demand

④ CT primary current

DISPLAY SET

(a) For three-phase 4-wire
Primary Current Setting (Default Setting: 5A)

- From top digit, select the value of the flickering digit by ⊕ and ⊖.
- The setting digit can be moved to right by the (SET).
- The setting digit can be moved to left by the (DISPLAY).
- Setting is available in range from 1.0A to 30000.0A
  [Less than 10A : Upper 2 digits setting
  Over 10A : Upper 3 digits setting]

* Error display (E05) appears when set out of 1.0 to 30000.0A range. After that, please press (SET), review the setting value and set it once again.

- Press (SET) at the lowest digit, the setting step will shift to the next one.

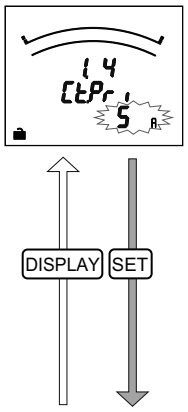
To ⑤Time constant for Active power demand

(b) For other phase wire system except Three-phase 4-wire

Set the primary current of the CT you want to combine.

1A	50A	500A	1.6kA	6000A
5A	60A	600A	2000A	6kA
6A	75A	750A	2kA	7500A
7.5A	80A	800A	2500A	7.5kA
8A	100A	1000A	2.5kA	8000A
10A	120A	1kA	3000A	8kA
12A	150A	1200A	3kA	10kA
15A	200A	1.2kA	4000A	12kA
20A	250A	1500A	4kA	20kA
25A	300A	1.5kA	5000A	25kA
30A	400A	1600A	5kA	30kA
40A				SP. Note 1

Note 1: If there is no primary current in the above that you want to set, select "SP." for special primary current setting.



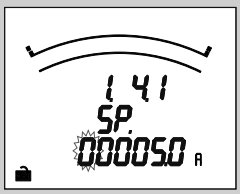
Setting except “SP” : To ⑤Time constant for Active power demand
When setting “SP” : To following “Special Primary Current”

"Special Primary Current" Settings (Default Setting: 5A)

- From top digit, select the value of the flickering digit by ⊕ and ⊖.
- The setting digit can be moved to right by the (SET).
- The setting digit can be moved to left by the (DISPLAY).
- Setting is available in range from 1.0A to 30000.0A
  [Less than 10A : Upper 2 digits setting
  Over 10A : Upper 3 digits setting]

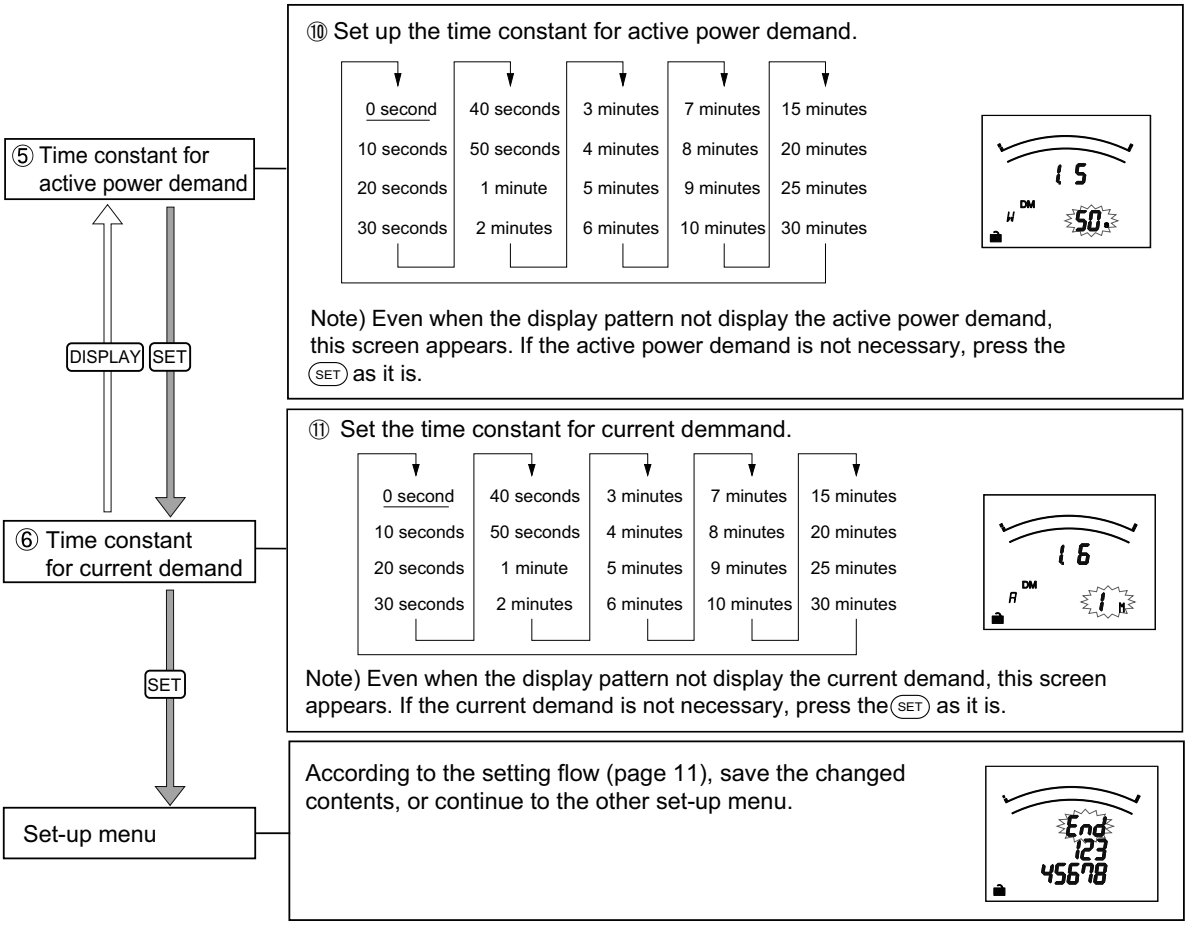
* Error display (E05) appears when set out of 1.0 to 30000.0A range. After that, please press (SET), review the setting value and set it once again.

- Press (SET) at the lowest digit, the setting step will shift to the next one.



To ⑤Time constant for Active power demand

3.2 Setting Menu 1: Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, and Time constant for Demand



In the case of use only by the Setting menu 1, please go to “5. Operation” in page 47.
In the case to use additional functions, please go to “Setting Menus 2 - 8” (from page 18 to 32).

Note	If the contents in the setting menu 1 are changed, the maximum value, minimum value, demand value of related measurement items will be reset. (However, active energy and reactive energy will not be reset.)

3. Settings

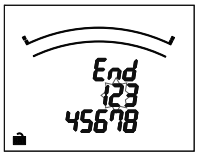
3.3 Setting Menu 2: Model code,Backlight,Display Update Time Setting

This section is for confirming model and set the backlight and the display update time. (These settings are not needed for normal use.)

In the operation mode, press (SET) + (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Setting menu

Set the set-up menu number to “2”.

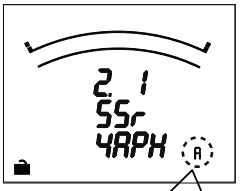


DISPLAY SET

① Model + option code

The model can be confirm. (This is only display, and settings cannot be changed.)

Display information		Model
Middle Line	Lower Line	
SSr	Blank	ME110SSR
	4AP	ME110SSR-4AP
	4APH	ME110SSR-4APH
	4A2P	ME110SSR-4A2P
	CC	ME110SSR-C
	CH	ME110SSR-CH
	Mb	ME110SSR-MB



<Note>
Analog output specification is displayed only for models with analog output.

A: Current specification (4-20mA)

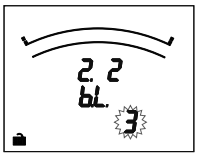
DISPLAY SET

② Backlight brightness

The backlight brightness can be adjusted.

1 ↔ 2 ↔ 3 ↔ 4 ↔ 5

Dark ⟶ Bright



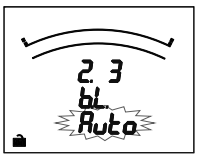
DISPLAY SET

③ Backlight auto off

The backlight can be set to continuous on (HoLd) or auto off (Auto).

HoLd ↔ Auto

Continuous on Auto off



<When auto off (Auto) is selected>

No button operation for 5 minutes → the backlight turns off

Button operation during off (Note) → the backlight turns on for 5 minutes

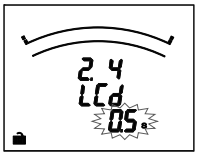
Note: At this moment, the display is not changed. When the operation button is pressed once again, the display is changed.

DISPLAY SET

④ Display update time

The display update time for the measured value can be change. If the display switches too quickly for you to read the displayed value, set it to 1.0 second.
(Normally, leave this setting to 0.5 second.)

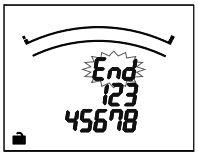
0.5 second ↔ 1 second



SET

Seting menu

According to the setting flow (page 11), save the changed contents, or continue to the other setting menu.



3. Settings

3.4 Setting Menu 3: Setting the Bar Graph, Unit Display, Expanded counting, and Harmonics Display

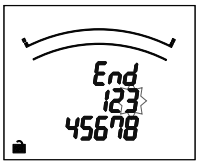
In this setting menu, you can do in detail set up for the bar-graph, unit, expanded counting, harmonics.

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Setting menu

DISPLAY SET

Set the set-up menu number to "3".



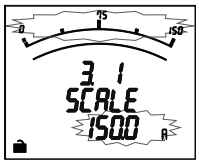
① Current maximum scale

DISPLAY SET

Set the current maximum scale.

+3 STEP (About 120%)
to
±0 STEP (100%: Rating)
to
-10 STEP (About 40%)

⊕ ⊖



Note: The maximum scale value becomes the value in the table on page 62.

② Active power maximum scale

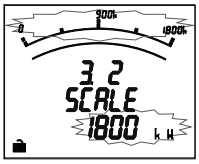
DISPLAY SET

Set the maximum scale of Active power, active power demand.

(1) Maximum scale value

+3 STEP (About 120%)
to
±0 STEP (100%: Rating)
to
-18 STEP (About 20%)

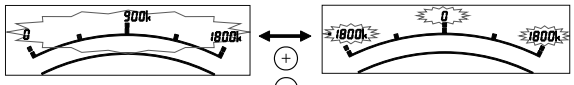
⊕ ⊖



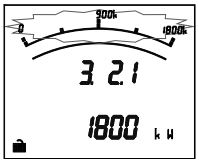
Note: The maximum scale value becomes the value in the table on page 63.

DISPLAY SET

(2) single deflection / double deflection



single deflection double deflection



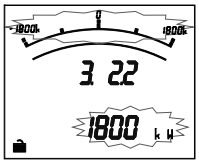
③ Active power unit

DISPLAY SET

Set Active power unit (W, kW, and MW).

Maximum scale value	Setting range
1,000W or higher 8,000W or less	W ⟷ kW
1,000kW or higher 8,000kW or less	kW ⟷ MW

Note: The unit cannot be changed beyond the above range.



④ Reactive power maximum scale

DISPLAY SET

Set the single deflection / double deflection of reactive power.
Single deflection is the LEAD polarity. (The default setting is double deflection.)

The setting method is same as that of ② Active power maximum scale.

⑤ Reactive power unit

DISPLAY SET

Set the reactive power unit (var, kvar, Mvar).

The setting method is same as that of ③ Active power unit.

3.4 Setting Menu 3: Setting the Bar Graph, Unit Display, Expanded counting, and Harmonics Display

⑥ Expanded counting

DISPLAY SET

⑦ Harmonics

SET

Setting menu

Set the combinations of imported / exported and lag / lead for active energy and reactive energy you want to display, and set the measurement method for reactive energy.

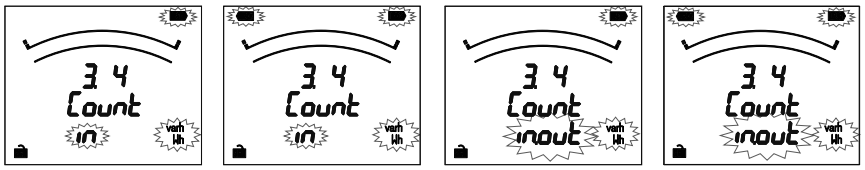
Combination (Setting value)	Active energy (Wh)		Reactive energy (varh)								Reactive energy measurement method(Note)
	Imported	Exported	Imported lag	Exported (lead)	Imported lead	Exported lag	Imported lag	Imported lead	Exported lag	Exported lead	
I	○		○								2 quadrant measurement
II	○		○			○					
III	○	○					○		○		4 quadrant measurement
IV	○	○					○	○	○	○	

Note: For more information about the measurement method for reactive energy, refer to page 52.

Combination I, II → It is suitable for the counting of equipment without the private electric generator and the reactive power of the capacitor load at the power factor = 0, generally.

Combination III, IV → It is suitable for the counting of equipment with the private electric generator.

<Example Screen>

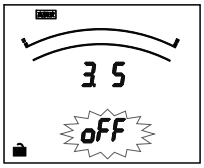


Combination I | Combination II | Combination III | Combination IV

Set the harmonic measurement.

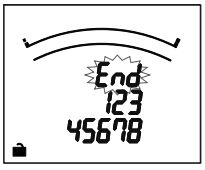
oFF ⟷ on

(Not displayed) (Displayed)



When the display is set to "on," the harmonic measured value can be displayed on an additional screen of the display pattern.

According to the setting flow diagram (page11), save the changed contents, or continue to the other setting menu.



Note

- Accuracy is defined to rated current. Although the maximum scale may display 120% or more of rated current and rated voltage in order to make a scale easy to read depending on the settings of VT/direct voltage and CT primary current, current input is within 100% of rated current.
- Even if a display pattern is selected that cannot display active power, reactive power, active energy, and reactive energy, it is possible to display the sign according to 2 quadrant / 4 quadrant measurement of the power factor and reactive power due to ⑥Expanded counting, so setting items for ⑥ Expanded counting will be displayed.

3.5 Setting Menu 4: Index Indicator Setting

The Index indicator (▲) of bar graph is set here. Up to 4 measurement items can be set.

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Setting menu

DISPLAY SET

① Indicator item 1

DISPLAY SET

② Indicator value 1

DISPLAY SET

③ Indicator item 2 to 4

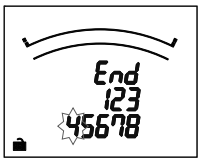
DISPLAY SET

④ Indicator value 2 to 4

SET

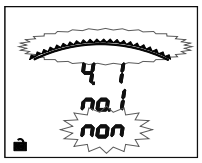
Setting menu

Set the set-up menu number to “4”.

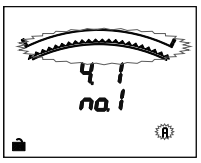


Set the measurement element to be assigned to 1.

non : No indicator display
A : Current
DA : Current demand
V : Voltage
W : Active power
DW : Active power demand
var : Reactive power
cosφ : Power factor



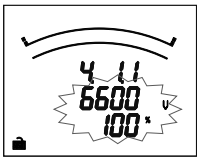
Display when "non" is selected



Display when "A" is selected

Set the value of Index indicator 1. The setting range is as shown in the following table.

Measuring element	Setting range	Setting step (Note)
A, DA	5 to 100 to 120(%)	1%
V	25 to 100 to 135(%)	1%
W, DW, var	-120 to 100 to 120(%)	1%
cosφ	-0.5 to 1 to 0.5	0.05



Note: A, DA, W, DW, and var show the percentage for the maximum scale value (±0 step) .
"V" shows the percentage for the VT primary voltage (or direct voltage).

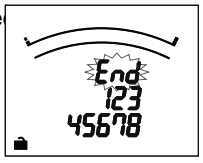
Set the measurement items to be allowed to 2 - 4.
Elements that are set elsewhere cannot be set.

The setting method is same as that of ① Indicator item 1 .

Set the indicator value for Indicators 2 to 4.

The setting method is same as that of ② Indicator value 1 .

According to the setting flow diagram (page 11), save the change contents, or continue to the other setting menu.



3.6 Setting Menu 5: Setting the Upper/Lower Limit Alarm, Backlight Flickers During Alarms, and Motor Startup Current Delay Time

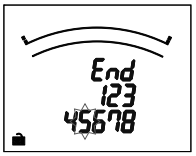
This section shows how to set the upper/lower limit alarm, backlight flickering during alarm, and motor starting current delay time.

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

For more details about each function, refer to the corresponding pages.
Upper/lower limit alarm → Page 53, Motor startup current → Page 57

Setting menu

Set the set-up menu number to “5”.



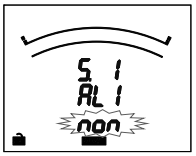
DISPLAY SET

① Alarm item 1

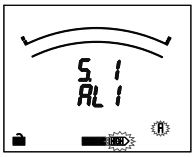
Set the Alarm item 1 to be allowed to measurement items.
The upper/lower limit measurement values can be monitored by this setting.

(a) For three-phase 4-wire

non
A upper limit
A lower limit
AN upper limit
DA upper limit
DA lower limit
DAN upper limit
V (L-N) upper limit
V (L-N) lower limit
V (L-L) upper limit
V (L-L) lower limit
W upper limit
W lower limit
DW upper limit
DW lower limit
var upper limit
var lower limit
cosφ upper limit
cosφ lower limit
Hz upper limit
Hz lower limit
Harmonic current total RMS value
N-phase harmonic current total RMS value
Harmonic voltage total distortion ratio



Display when "non" is selected



Display when "A upper limit" is selected

DISPLAY SET

(b) For other phase wire system except three-phase 4-wire

non
A upper limit
A lower limit
DA upper limit
DA lower limit
V upper limit
V lower limit
W upper limit
W lower limit
DW upper limit
DW lower limit
var upper limit
var lower limit
cosφ upper limit
cosφ lower limit
Hz upper limit
Hz lower limit
Harmonic current total RMS value
Harmonic voltage total distortion ratio

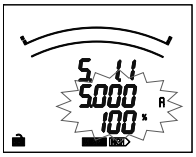
Note 1. Measurement items that are not selected in the display pattern can be selected.
Note 2. DA: Current demand, DAN: N-phase demand current, V (L-N): Phase to neutral voltage, V (L-L): phase to phase voltage, DW: Active power demand

3.6 Setting Menu 5: Setting the Upper/Lower Limit Alarm, Backlight Flickers During Alarms, and Motor Startup Current Delay Time

② Alarm value 1

Set the alarm value for upper/lower limit alarm element 1. The following table shows the setting range.

Measuring element	Setting range	Setting (Note) step
A, AN, DA, DAN upper limit	5 to 100 to 120(%)	1%
A, DA lower limit	3 to 10 to 95(%)	1%
V (L-N), V (L-L) upper limit	25 to 110 to 135(%)	1%
V (L-N), V (L-L) lower limit	20 to 70 to 95(%)	1%
W, DW, var upper limit	-95 to 100 to 120(%)	1%
W, DW, var lower limit	-120 to 3 to 95(%)	1%
cosφ upper limit	-0.05 to 1 to 0.05	0.05
cosφ lower limit	-0.05 to -0.5 to 0.05	0.05
Hz upper limit	45 to 65 (Hz)	1Hz
Hz lower limit	45 to 65 (Hz)	1Hz
Harmonic current total RMS value	1 to 35 to 120(%)	1%
N-phase harmonic current total RMS value	1 to 35 to 120(%)	1%
Harmonic voltage total distortion ratio	0.5 to 3.5 to 20(%)	0.5



Note: A, AN, DA, DAN, W, DW, and var show the percentage for the maximum scale value (±0 step). "V" shows the percentage for the VT primary voltage (or direct voltage). (The "V" for 1-phase 3-wire is the percentage for 110V. Alarm monitoring is executed using twice the value which set upper/lower limit alarm for the 12-phase and 13-phase.)

DISPLAY SET

③ Alarm item 2 to 4

Set the measurement element assigned to the upper/lower limit alarm items 2 to 4. Elements that are set elsewhere cannot be set.

The setting method is the same as ① Alarm item 1.

DISPLAY SET

④ Alarm value 2 to 4

Set the alarm value for the upper/lower limit alarm items 2 to 4.

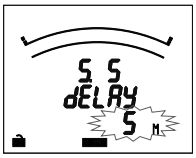
The setting method is the same as ② Alarm value 1.

DISPLAY SET

⑤ Alarm delay time

Set the alarm mask time for when you want to prevent a momentary overload or noise alarm.

When this is set, an alarm is generated only when the alarm value over the upper/lower limit alarm value for a longer time than the delay time. On the setting screen, seconds are indicated by "s" and minutes are indicated by "M".



0 seconds	30 seconds	2 minutes
5 seconds	40 seconds	3 minutes
10 seconds	50 seconds	4 minutes
20 seconds	1 minute	5 minutes

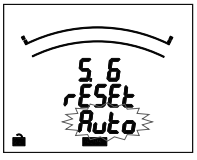
Note:
When all settings for ① Alarm item 1 and ③ Alarm item 2 to 4 are set to "non," this setting will be skipped.

DISPLAY SET

⑥ Alarm cancel method

Set the alarm cancel method at generation of alarm. (screen, relay)

Reset method (Set-up value)	Description (Refer to pages 53 and 54)
Automatic (Auto)	When there is no alarm generation condition, alarm is automatically reset.
Manual (HoLd)	The alarm will continue even when the alarm generated conditions no longer exist. It is necessary to execute button operation to cancel the alarm.



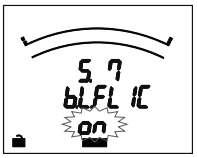
Note: When all settings for ① Alarm item 1 and ③ Alarm item 2 to 4 are set to "non," this setting will be skipped.

DISPLAY SET

3.6 Setting Menu 5: Setting the Upper/Lower Limit Alarm, Backlight Flickers During Alarms, and Motor Startup Current Delay Time

⑦ Backlight flickers during alarms

It is possible to make the backlight to flicker when an alarm is generated.



oFF ⟷ on
(Not flicker) (Flicker)

Note: When all settings for ①Alarm item 1 and ③Alarm item 2 to 4 are set to "non," this setting will be skipped.

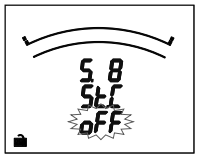
DISPLAY SET

By using this setting for motor current monitoring delay time, it is possible to prevent unnecessary maximum value updating and unnecessary alarms caused by the motor startup current.

When this setting is not needed → Select "oFF" and press (SET) , and return to the Setting Menu.

When this setting is executed → Select "on" and press (SET) , and go to (1) below.

oFF ⟷ on



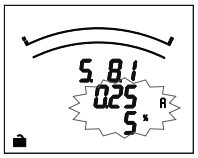
⑧ Motor starting current delay time

(1) Motor starting current value.

Set the value for detecting the motor starting current.

Setting range	Setting step (Note)
3 to 5 to 120(%)	1%

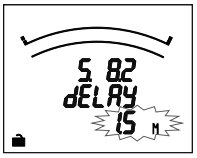
* This is the percentage for the maximum scale value for the current (±0 step).



(2) Motor starting current delay time

After the motor starting current is detected, maximum value update is not executed and an alarm is not generated for the delay time. On the setting screen, seconds are indicated by "s" and minutes are indicated by "M".

DISPLAY SET

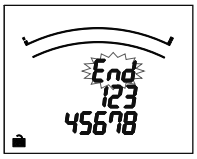


SET

1 s, 3 s, 5 s, 10 s, 15 s, 20 s, 30 s, 45 s, 1 M, 1.5 M, 2 M, 3 M, 4 M, 5 M

Setting menu

According to the setting flow (page 11), save the changed contents, or continue to the other setting menu.



3. Settings

3.7 setting Menu 6: Setting the Analog Output and Pulse Output

Output item of analog output, pulse output, pulse unit and so forth are set here.

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Setting menu

DISPLAY SET

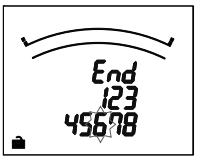
① Analog output specification

DISPLAY SET

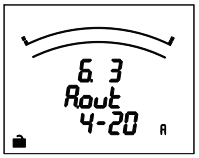
② Analog output CH1 output item

DISPLAY SET

Set the setting menu number to “6”.



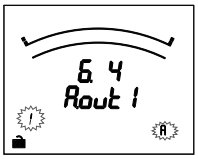
Analog output specification is displayed.
(Cannot be changed)



For current specification(4-20mA)

Set the measurement item to be output to analog output CH1.

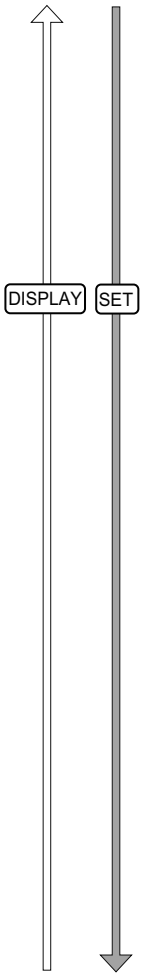
Select a measurement item for output from the following table.



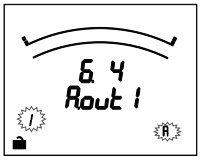
3-phase 4-wire		
non	W_1	$\cos\varphi_1$
A_1	W_2	$\cos\varphi_2$
A_2	W_3	$\cos\varphi_3$
A_3	W_Σ (CH3)	$\cos\varphi_\Sigma$ (CH4)
A_N	Demand W_1	Hz
A_{AVG} (CH1)	Demand W_2	Harmonic A_1
Demand A_1	Demand W_3	Harmonic A_2
Demand A_2	Demand W_Σ	Harmonic A_3
Demand A_3	var_1	Harmonic A_N
Demand A_N	var_2	Harmonic V_{1N}
Demand A_{AVG}	var_3	Harmonic V_{2N}
V_{1N}	var_Σ	Harmonic V_{3N}
V_{2N}	VA_1	
V_{3N}	VA_2	
V_{AVG} (L-N)(CH2)	VA_3	
V_{12}	VA_Σ	
V_{23}		
V_{31}		
V_{AVG} (L-L)		

AVG: Average ∑: Total RMS value

3.7 Setting Menu 6: Setting the Analog Output and Pulse Output



3-phase 3-wire (2CT, 3CT)	1-phase 3-wire (1N2 display)	1-phase 3-wire (1N3 display)	1-phase 2-wire
non	non	non	non
A1 (CH1)	A1 (CH1)	A1 (CH1)	A (CH1)
A2	AN	AN	Demand A
A3	A2	AT	V (CH2)
Demand A1	Demand A1	Demand A1	W (CH3)
Demand A2	Demand AN	Demand AN	Demand W
Demand A3	Demand A2	Demand A3	var
VRS (CH2)	VRN (CH2)	VRN (CH2)	cosφ (CH4)
V23	VN2	VNT	Hz
VT1	V12	VT1	Harmonic A
W (CH3)	W (CH3)	W (CH3)	Harmonic V
Demand W	Demand W	Demand W	
var	var	var	
cosφ (CH4)	cosφ (CH4)	cosφ (CH4)	
Hz	Hz	Hz	
Harmonic A1	Harmonic A1	Harmonic A1	
Harmonic A2(3CT)	Harmonic A2	Harmonic A3	
Harmonic A3	Harmonic V1N	Harmonic V1N	
Harmonic V12	Harmonic V2N	Harmonic V3N	
Harmonic V23			



Note 1:The same measurement item can be set for each analog output.
Note 2:It is possible to select measurement item that are not included in the set display pattern.
Note 3:Setting to "non" are minimum output. In addition, it moves to the next analog output setting.
Note 4:For the harmonic current, the total RMS value is output by a scale from 0 to 60% of the rating.
For the harmonic voltage, the total distortion ratic is output by scaling 0 to 20%.
Note 5:Underlined portions are the factory default settings for measurement elements assigned to each analog output.

3.7 Setting Menu 6: Setting the Analog Output and Pulse Output

③ Analog output CH1 detailed setting

DISPLAY SET

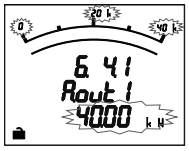
Analog output detailed set-up

(The following setting can be made separately from the measurement items included in the display pattern.)

(1) When the current / current demand / active power / active power demand / reactive power are set as output elements

(a) Set the measurement value for the maximum analog output value.

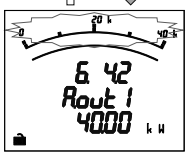
Output item	Setting range *3
A Demand A	+3 STEP (About 120%) to ±0 STEP (100%: Rating) to -10 STEP (About 40%)
W Demand W var	+3 STEP (About 120%) to ±0 STEP (100%: Rating) to -18 STEP (About 20%)



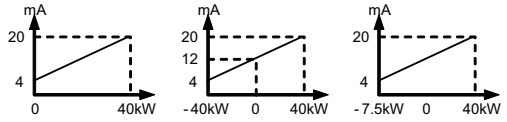
DISPLAY SET *1

(b) Set the Singledeflection / dauble deflection / special deflection for analog output.

Output item	Setting range
W Demand W	Single deflection ↔ Dauble deflection ↔ Special deflection
var	Single deflection ↔ Dauble deflection



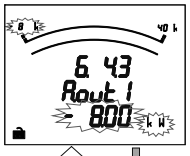
<Single deflection> <Double deflection> <Special deflection>



DISPLAY SET *2

(c) For special deflection, set the measurement value for the minimum analog output value.

Output item	Setting range *3
W Demand W	-21 STEP (About 15%) to -15 STEP (About 25%) to ±0 STEP (About 100%)



DISPLAY SET

To next CH settings

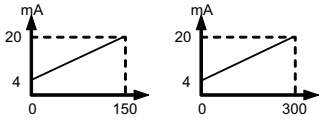
*1. When A or Demand A are set as output items, it moves to the next analog output settings.
*2. When other than special deflection is selected, it moves to the next analog output settings.
*3. Detailed setting values are according to the values shown in the table on pages 62 and 63.

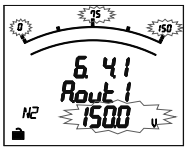
(2) When voltage is set as an output item for 1-phase 3-wire
Set V_{1N} and V_{2N} (V_{3N}) for the maximum analog output value.

150V ↔ 300V

Note:
V_{12} (V_{13}) is fixed at 300V.

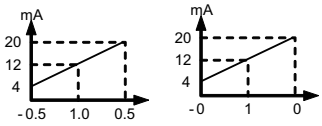
<When 150V is set> <When 300V is set>

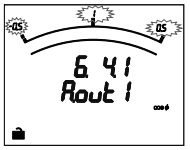




(3) When power factor is set as an output item
Set the power factor value for the maximum analog output values.

-0.5 to 1.0 to 0.5
-0 to 1 to 0

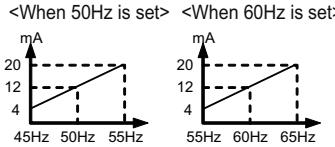


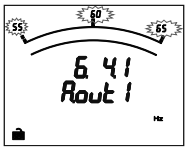


(4) When the frequency is set as an output item
Set the frequency range for analog output.

45 to 50 to 55(Hz)
55 to 60 to 65(Hz)

<When 50Hz is set> <When 60Hz is set>





3.7 Setting Menu 6: Setting the Analog Output and Pulse Output

④ Analog output CH2 to CH4 measurement item

DISPLAY SET

⑤ Analog output CH2 to CH4 detailed settings

DISPLAY SET

⑥ Analog output limit

DISPLAY SET

⑦ Pulse output 1 output item

DISPLAY SET

⑧ Pulse output 1 pulse unit

DISPLAY SET

Set the measurement item that is output to analog output CH2 to CH4.

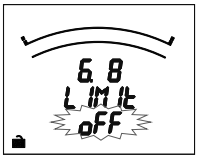
The setting method is the same as ② Analog output CH1 output item.

Analog output CH2-CH4 detailed set-up

The setting method is the same as ③ Analog output CH1 detailed setting.

Set analog output for when full scale is over the limit.

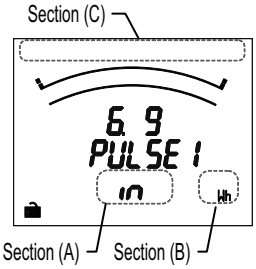
Setting value	Description
oFF (No limit)	For the span value, the maximum output is +5% and the minimum output is -5%.
on (Limited)	For the span value, the maximum output is +1% and the minimum output is -1%.



Note: When the output items for all analog output are set to "non," this setting is skipped.

Set the item that is output to pulse output 1.

Setting value	Display		
	Section (A)	Section (B)	Section (C)
Active energy (Imported)	in	Wh	OFF
Active energy (Exported)	out	Wh	OFF
Reactive energy (Imported, Lag)	in	varh	LAG
Reactive energy (Imported, Lead)	in	varh	LEAD
Reactive energy (Exported, Lag)	out	varh	LAG
Reactive energy (Exported, Lead)	out	varh	LEAD
non (No output)	non	OFF	OFF

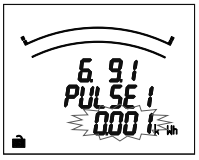


Note: The segment shown in the left table flickers according to the selected element.

Set the pulse value of pulse output 1.
Pulse value is selected from the table below, according to total load [kW].

$$\text{Total load [kW]} = \frac{\alpha \times (\text{VT Primary Voltage}) \times (\text{CT Primary Current})}{1000}$$

α: 1 1-phase 2-wire
2 1-phase 3-wire
$\sqrt{3}$ 3-phase 3-wire
3 3-phase 4-wire



*1: For 1-phase 3-wire setting, the VT primary voltage is calculated using 110V.
*2: For direct voltage setting, the direct voltage is used for calculation instead of the VT primary voltage.
*3: For 3-phase 4-wire setting, the VT primary voltage is calculated using the phase to neutral voltage.

Total load [kW]	Display format		Possible pulse unit settings [kWh/pulse]			
	Digital display	Multiplier				
Less than 10	8888.88	× 1	1	0.1	0.01	0.001
10 or higher but less than 100	88888.8	× 1	10	1	0.1	0.01
100 or higher but less than 1000	88888.8	× 10	100	10	1	0.1
1000 or higher but less than 10000	88888.8	× 100	1000	100	10	1
10000 or higher but less than 100000	88888.8	× 1000	10000	1000	100	10
100000 or higher	88888.8	× 10000	100000	10000	1000	100

Note 1: When ⑦Pulse output 1 output item is set to "non," this setting will be skipped.
Note 2: The factory default setting values are minimum values for the pulse unit that can be set.
Note 3: For reactive power, kW in the above table needs to be read as kvar, and kWh needs to be read as kvarh.

3.7 Setting Menu 6: Setting the Analog Output and Pulse Output

⑨ Pulse output 2 output item

Set the element that is output to pulse output 2. (ME110SSR-4A2P)
The same elements as pulse output 1 can be set.

The setting method is the same as ⑦ Pulse output 1 output item.
(Factory default setting value: Reactive energy (Imported, Lag)

DISPLAY SET

⑩ Pulse output 2 pulse unit

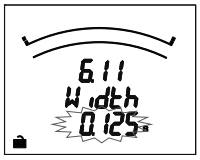
Set a pulse unit for pulse output 2. (ME110SSR-4A2P)

The setting method is the same as for ⑧ Pulse output 1 pulse unit.
(Factory default setting values: Minimum possible value for pulse unit)

DISPLAY SET

⑪ Pulse width

Set the pulse width for output pulse.
Set according to the input pulse conditions for the receiver.



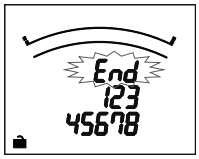
0.125s ↔ 0.500s ↔ 1.000s

Note	When the pulse unit is set to the minimum value and the pulse width is set to 0.500s or 1.000s, the pulse output cannot follow if the load is too large, which can result in a decrease in the pulse output number.

SET

Setting menu

According to the setting flow (page 11), save the changed contents, or continue to the other setting menu.

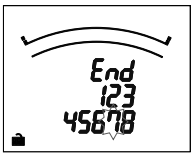


3.8 Setting Menu 7: Communication Set-up (ME110SSR-C,ME110SSR-CH)

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Setting menu

Set the set-up menu number to “7”.

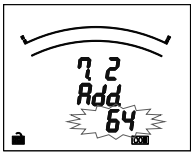


DISPLAY SET

① CC-Link station number

Set the CC-Link station number.

Selectable station number: 1 to 64

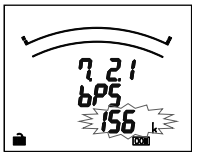


DISPLAY SET

② CC-Link baud rates

Set the CC-Link baud rate.

156kbps ↔ 625kbps ↔ 2.5Mbps ↔ 5Mbps ↔ 10Mbps



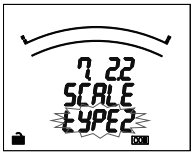
DISPLAY SET

③ Power data resolution

Select a resolution monitorong data for power (reactive power).

tyPE1 (High resolution) ↔ tyPE2 (Conventional compatible)

To maintain data compatibility with multi-indicator instruments on our older products, select tyPE2.
For details , please reter to the programming manuals.



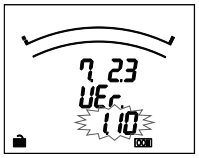
DISPLAY SET

④ CC-Link version

Set the CC-Link version according to the configuration of the used CC-LInk system.

1.10 ↔ 2.00

(Ver.1 remote device) (Ver.2 remote device)

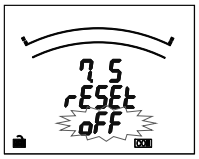


DISPLAY SET

⑤ Communication reset

When the changed abore settings are enabled, set to "on."
(If this is not set to "on," the changed station number, baud rates, power data resolution and CC-Link version will not be applied.)

oFF ↔ on



DISPLAY SET

⑥ Digital input status (DI1 to DI3) display

Set whether to display the digital input status (DI1 to DI3).

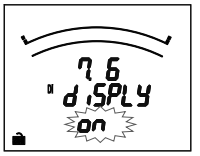
(ME110SSR-CH only)

oFF ↔ on

(Not displayed) (Displayed)

For ME110SSR-C, the following settings can be skipped.

When the display is set to on (displayed), the digital input status can be displayed on an additional screen of the display pattern.



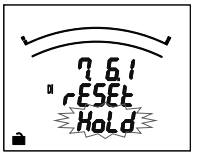
DISPLAY SET

⑦ Digital input reset method (DI1 to DI3)

Set the digital input (DI1 to DI3) cance method.

(ME110SSR-CH only)

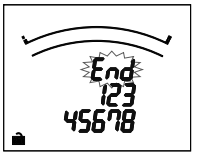
Cancel method (Set-up value)	Description
Auto reset (Auto)	If the digital input turns off (open), the digital input status automatically turns off (open).
Latch (HoLd)	After it is detected that digital input is on (closed), digital input status is kept on (closed) until executing latch cancelation, even when the digital input turns off (open).



SET

Setting Menu

According to the setting flow diagram (page 11), save the changed contents, or continue to the other setting menu.



3.8 Setting Menu 7: Communication Set-up (ME110SSR-MB)

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

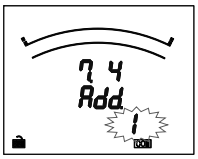
Setting menu

DISPLAY / SET

① ModBus address

Set the ModBus address number.

Selectable addresses: 1 to 255

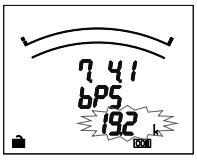


DISPLAY / SET

② ModBus baud rates

Set the ModBus baud rate.

2400bps
4800bps
9600bps
19.2kbps
38.4kbps



DISPLAY / SET

③ ModBus parity

Set the ModBus parity.

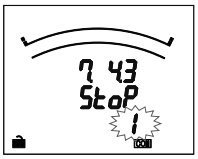
non
odd
EVEn (EUEn)

DISPLAY / SET

④ ModBus stop bit

Set the ModBus stop bit.

Stop bit 1
Stop bit 2



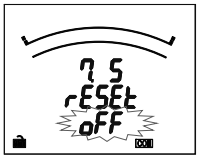
DISPLAY / SET

⑤ Communication module reset

To enable the changed address, baud rate, parity, and stop bit, select "on."

(If you don't select "on", the changed address, baud rate, parity, and stop bit will not be applied.)

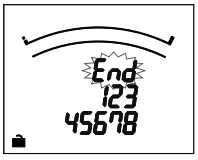
oFF ⟷ on



SET

Setting menu

According to the setting flow (page 11), save the changed contents, or continue to the other setting menu.



3. Settings

3.9 setting Menu 8: Setting the Operating Time Display, CO_2 Emission Display, and Element Information

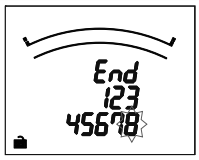
This section shows how to set the operation time and CO_2 emission display.

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Setting menu

DISPLAY SET

Set the set-up menu number to “8”.



① Operation time display

The current measurement time is calculated and is displayed as the load operation time. Select whether to display or not the operation time. (The operation time is calculated only when “on” is selected.)

oFF ⟷ on

(Not displayed) (Displayed)

DISPLAY SET

② CO_2 emission display

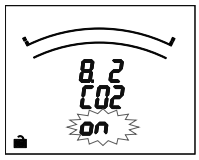
CO_2 emissions are converted based on the active energy (imported) and are displayed.

When CO_2 emission display is needed → Select "on", press (SET), and go to the following settings.

When CO_2 emission display is not needed → Select "oFF", press (SET), and go to the Set-up Menu.

oFF ⟷ on

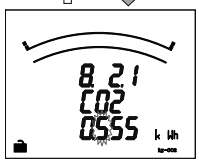
(Not displayed) (Displayed)



Set a CO_2 conversion factor.
(Factory default setting: 0.555kg-CO_2/kWh)

DISPLAY SET

- Select a value using (+) and (-) for the blinking digit from the highest digit.
- Use (SET) to move the setting digit (blinking digit) lower.
- Use (DISPLAY) to move the setting digit (blinking digit) higher.
- Setting is possible within the range from 0.000 to 0.999 (kg-CO_2/kWh).
- Press (SET) at the lowest digit to return to the Setting Menu.

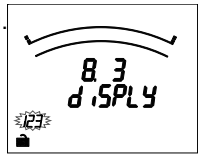


DISPLAY SET

③ Switch element information

It is possible to change the line element information for displaying.

123 ⇔ UVW ⇔ RYB ⇔ ABC ⇔ XYZ



The following is element information.

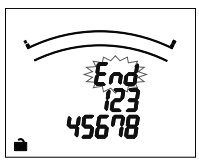
	3P4W	3P3W	1P3W (1N2 display)	1P3W (1N3 display)
RST	RSTN	RST	RNS	RNT
123	123N	123	1N2	1N3
UVW	UVWN	UVW	UNV	UNW
RYB	RYBN	RYB	RNY	RNB
ABC	ABCN	ABC	ANB	ANC
XYZ	XYZN	XYZ	XNY	XNZ

(However, bar graph display is expressed using RSTN and 123N.)

SET

Setting menu

According to the setting flow (page 11), save the changed contents, or continue to the other setting menu.



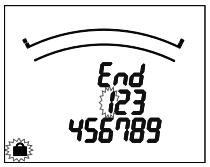
3. Settings

3.10 Setting Value Confirmation Menu 1: Confirming the Setting Values for Setting Menu 1

This section shows how to confirm the setting values for Setting Menu 1 (phase wire system, display pattern, VT/direct voltage, CT primary current, etc.).
When (SET) is pressed for at least 2 seconds in the operation mode, the following operation becomes available.

Setting value confirmation menu

Set the setting value confirmation menu number to “1”.



DISPLAY SET

① Model display

It is possible to confirm the model.
The following table shows the display contents and corresponding model.

Display information		Model
Middle	Bottom	
55r	Blank	ME110SSR
	4AP	ME110SSR-4AP
	4APH	ME110SSR-4APH
	4A2P	ME110SSR-4A2P
	CC	ME110SSR-C
	CH	ME110SSR-CH
	Mb	ME110SSR-MB

<Note>
Analog output specification is displayed only for models with analog output.

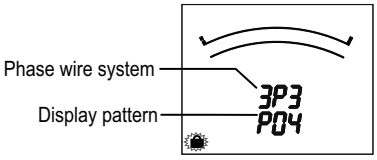
A: Current specification (4-20mA)

DISPLAY SET

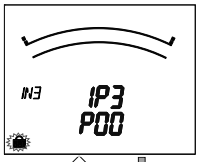
② Phase wire system + display pattern

It is possible to confirm the setting values for the phase wire system and display pattern.

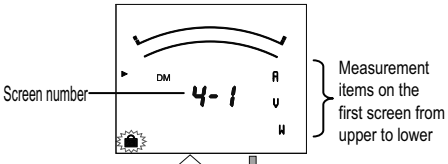
<When the display pattern is other than P00>



<When the display pattern is P00>



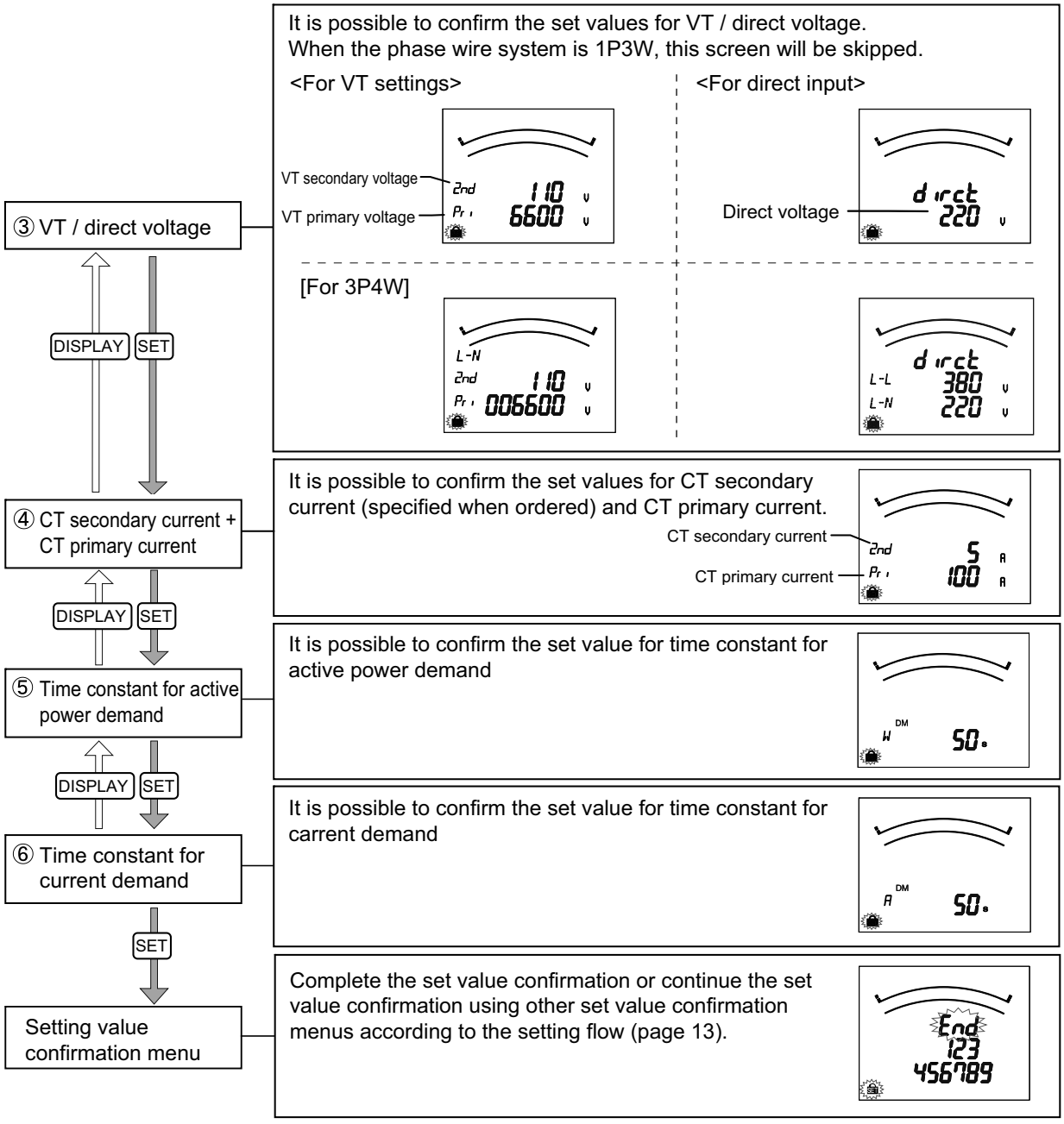
DISPLAY SET



DISPLAY SET

This continues according to the set number of screens. (Up to 4 screens)

3.10 Setting Value Confirmation Menu 1: Confirming the Setting Values for Setting Menu 1


③ VT / direct voltage
DISPLAY
SET
④ CT secondary current + CT primary current
DISPLAY
SET
⑤ Time constant for active power demand
DISPLAY
SET
⑥ Time constant for current demand
SET
Setting value confirmation menu
It is possible to confirm the set values for VT / direct voltage.
When the phase wire system is 1P3W, this screen will be skipped.
<For VT settings>
<For direct input>
VT secondary voltage
VT primary voltage
Direct voltage
[For 3P4W]
It is possible to confirm the set values for CT secondary current (specified when ordered) and CT primary current.
CT secondary current
CT primary current
It is possible to confirm the set value for time constant for active power demand
It is possible to confirm the set value for time constant for carrent demand
Complete the set value confirmation or continue the set value confirmation using other set value confirmation menus according to the setting flow (page 13).

3.11 Setting Value Confirmation Menus 2 to 8: Confirming the Setting Values for Setting Menus 2 to 8

When (SET) is pressed for at least 2 seconds in the operation mode, operation becomes possible.
The screen transitions and operations are the same as for Setting Menus 2 to 8.
Refer to Set-up Menus 2 to 8 (pages 18 to 32).
(Note: Settings cannot be changed in the Setting value confirmation mode.)

3.12 Initializing Related Items by Changing Settings

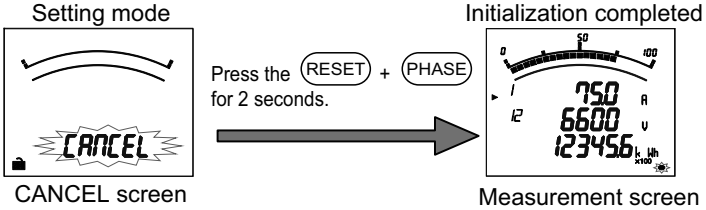
When a setting value is changed, the related setting items and measurement data (maximum/minimum values) will return to the default settings. Refer to the following list.

Initialized item \ Setting item to be changed				Menu 1: Phase wire system	Menu 1: Display pattern	Menu 1: Display pattern P00 screen configuration	Menu 1: VT/direct voltage	Menu 1: CT primary current	Menu 4: Indicator item	Menu 5: Upper/lower limit alarm item
Setting item	Menu 1	Phase wire system								
		Display pattern		●						
		Display pattern P00 screen configuration		●	●					
		VT/direct voltage		●						
		CT primary current		*1						
	Menu 3	Current scale		*1				●		
		Power scale		●			●	●		
		Power unit		●						
		Reactive power scale		●			●	●		
		Reactive power unit		●						
	Menu 4	Indicator item		●	●	●				
		Indicator value		●	●	●			●	
	Menu 5	Upper/lower limit alarm item		●						
		Upper/lower limit alarm value		●						●
	Menu 6	Analog output detailed settings								
		Output element	For A	●				●		
			For DA	●				●		
			For V (For 1P3W only)	●						
			For W	●			●	●		
			For VA	●			●	●		
			For DW	●			●	●		
			For var	●			●	●		
			For cosφ	●						
			For Hz	●						
Measurement data	Current Maximum/minimum value			●				●		
	Current demand Maximum/minimum value			●				●		
	Voltage Maximum/minimum value			●			●			
	Active power Maximum/minimum value			●			●	●		
	Active power demand power Maximum/minimum value			●			●	●		
	Reactive power Maximum/minimum value			●			●	●		
	Apparent power Maximum/minimum value			●			●	●		
	Power factor Maximum/minimum value			●			●	●		
	Frequency Maximum/minimum value			●						
	Harmonic current Maximum value			●				●		
	Harmonic voltage Maximum value			●			●			

●: This indicates that the setting value is the default value and the measurement data is zero.
*1: This is the default value changing from 3P4W to others.

3.13 Initializing All Settings

When the following operations are executed, all settings are initialized to the factory defaults.
Only the settings are initialized to the defaults. Adjusted values (Test Mode Menu 2) and active energy values are not changed.
To initialize all settings to the factory defaults, execute the following operation from the CANCEL screen in the setting mode.
For more information about how to get to the CANCEL screen, refer to 3.1 Setting flow (page 11).

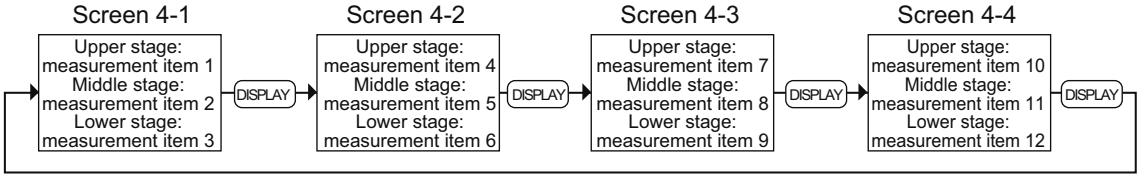


3.15 Setting the Special Display Pattern P00

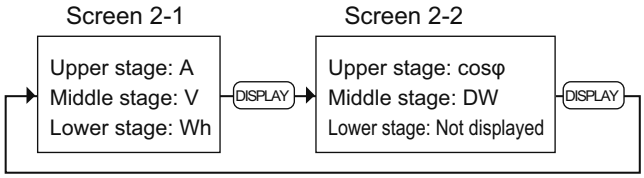
Even if there is no display pattern that you like in the display patterns P01 to P13 (P14, P15), individual set-up is available by the display pattern P00.

This set-up is made in the setting menu 1. Explanation begins with the set “P00” in ② display pattern of the setting menu 1 (page 13). (Others are omitted here, so refer to the setting menu 1.)

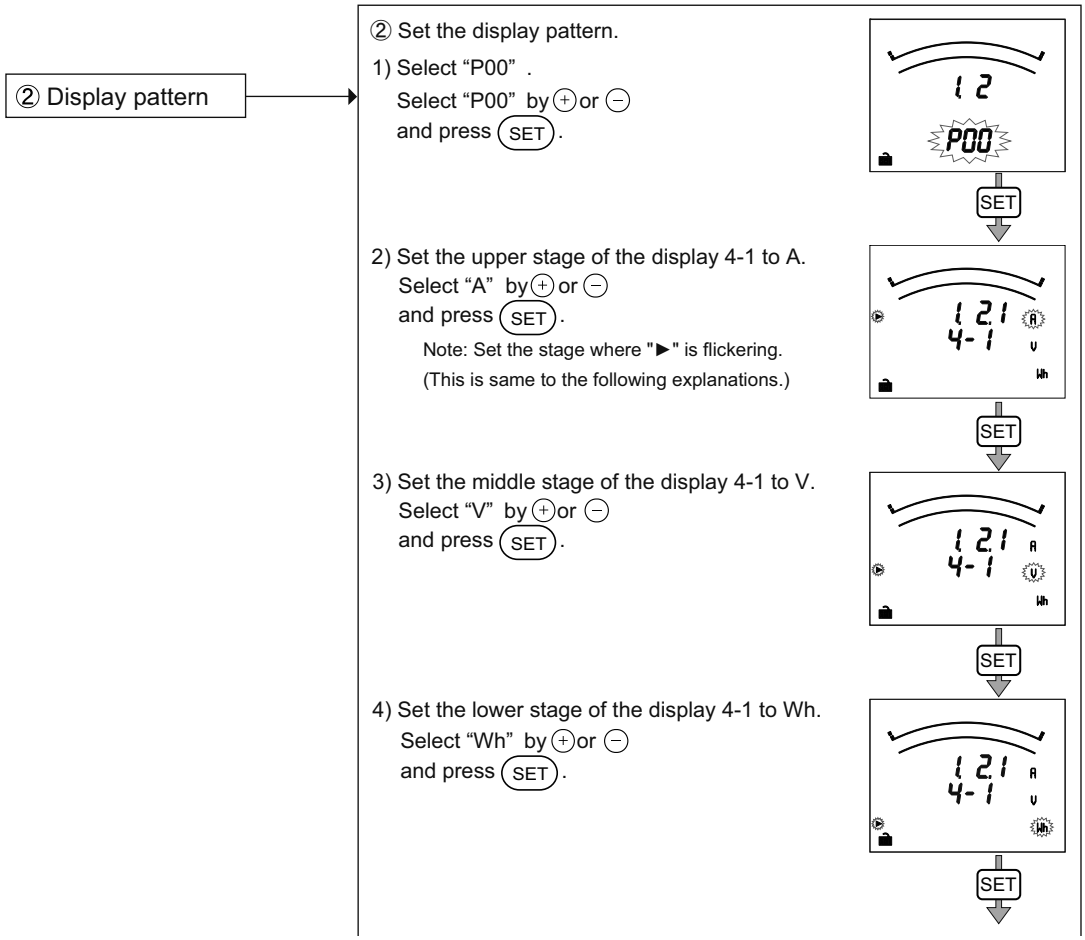
■ The number of settable display is up to 4. And the number of measurement elements to be displayed is up to 12 items.



■ Explanation is made with the example of the following display pattern.



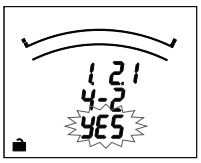
■ Setting method


② Display pattern
② Set the display pattern.
1) Select “P00” .
Select “P00” by ⊕ or ⊖
and press SET.
P00
SET
2) Set the upper stage of the display 4-1 to A.
Select “A” by ⊕ or ⊖
and press SET.
Note: Set the stage where "►" is flickering.
(This is same to the following explanations.)
4-1
SET
3) Set the middle stage of the display 4-1 to V.
Select “V” by ⊕ or ⊖
and press SET.
4-1
SET
4) Set the lower stage of the display 4-1 to Wh.
Select “Wh” by ⊕ or ⊖
and press SET.
4-1
SET

3.15 Setting the Special Display Pattern P00

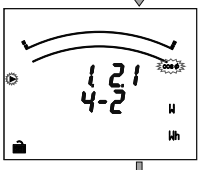
5) Set the display of the display 4-2.
Select “yES” by ⊕ or ⊖
and press (SET).

When not to display the display 2,
select “no” and press (SET).



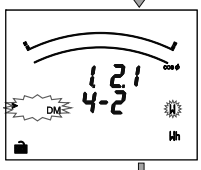
SET

6) Set the upper stage of the display 4-2 to cosφ.
Select “cosφ” by ⊕ or ⊖
and press (SET).



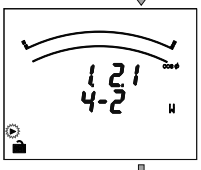
SET

7) Set the middle stage of the display 4-2 to DW.
Select “cosφ” by ⊕ or ⊖
and press (SET).



SET

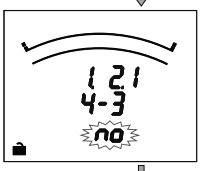
8) Set the lower stage of the display 4-2 to no display.
Set the unit code of the lower stage to no display
by ⊕ or ⊖ and press (SET).



SET

9) Set the display 4-3 to no display.
Select “no” by ⊕ or ⊖
and press (SET).

Note: When the display 4-3 is set to no display, the display 4-4 is also set to no display automatically.



SET

③ VT / direct voltage

(hereafter same as the setting menu 1)

Note	1. The following measurement items cannot be set by the display pattern P00. Set them separately in the setting menu 3 (page 19) or setting menu 8 (page 32). Exported active energy, exported reactive energy, capacitive reactive energy, inductive reactive energy, harmonic current, harmonic voltage, operation time, and CO_2 emission 2. Phase cannot be specified by current, voltage. Press PHASE in the operation mode to change phase. 3. Active energy(Exported), and reactive energy cannot be displayed at the upper stage and the middle stage. Active energy (Imported) cannot be set to the top line. 4. For settings other than 3-phase 4-wire, the following measurement elements cannot be set. N-phase current, N-phase demand current, and apparent power.

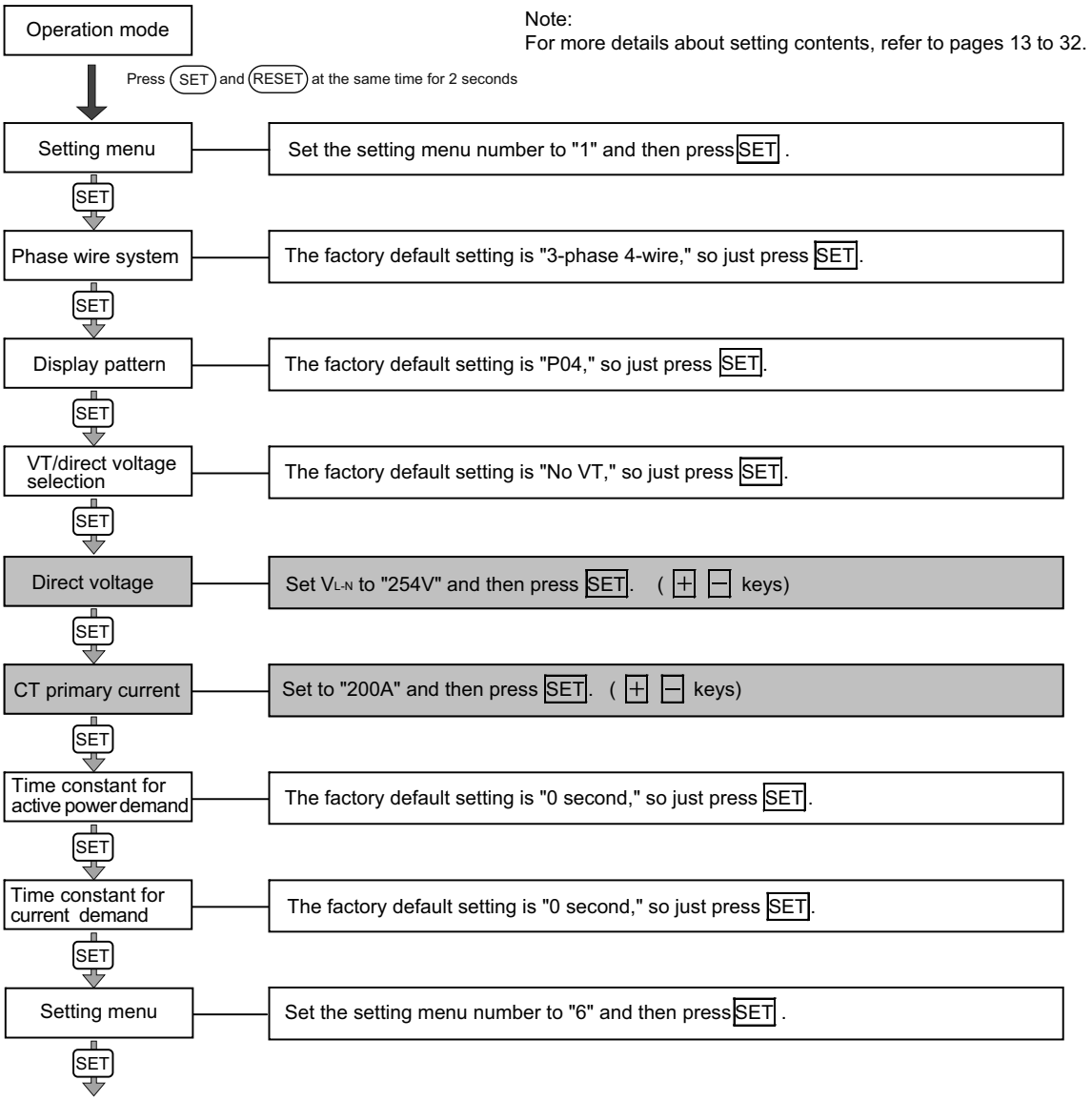
3.16 Examples of Simple Settings

The following shows a simple setting example.

■Setting Example Model: ME110SSR-4APH(4-20mA specification)
Phase wire system: 3-phase 4-wire
Measuring element: A_{AVG}, $V_{AVG(L-N)}$, W_{Σ}, $\cos\varphi_{\Sigma}$
Direct voltage: 254V/440V
CT primary current: 200A
Active power scale: 160kW (Standard: Rating 100%)
Analog output: CH1(A_{AVG}, 200A), CH2($V_{AVG(L-N)}$), CH3(W_{Σ}, 160kW), CH4($\cos\varphi_{\Sigma}$), no output limit
Pulse output: Electric energy (power reception), pulse unit (1kWh/pulse)

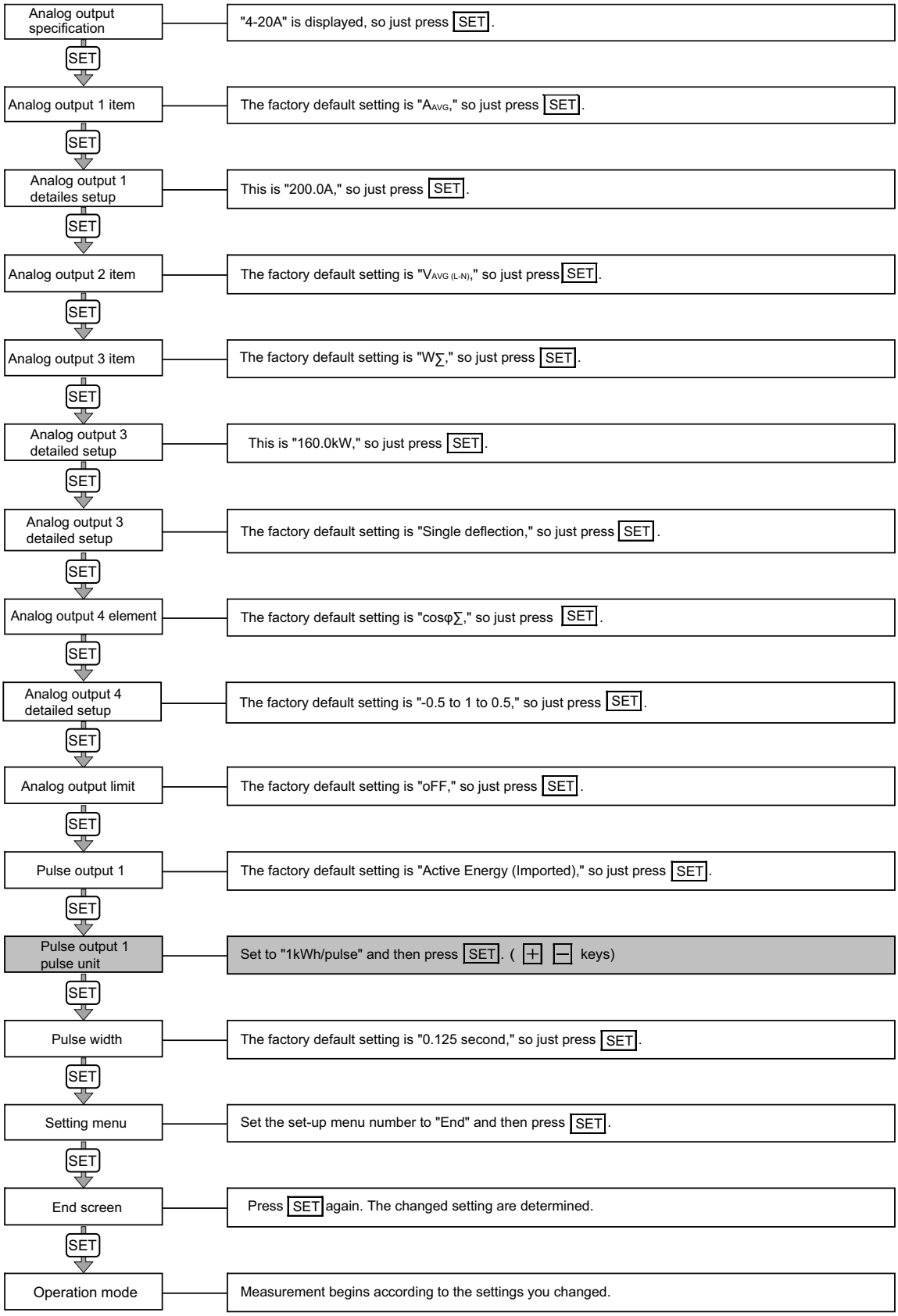
■Setting Procedure

Items of which setting value need to be changed are indicated by [ ].


Operation mode
Press SET and RESET at the same time for 2 seconds
Setting menu
Set the setting menu number to "1" and then press SET.
SET
Phase wire system
The factory default setting is "3-phase 4-wire," so just press SET.
SET
Display pattern
The factory default setting is "P04," so just press SET.
SET
VT/direct voltage selection
The factory default setting is "No VT," so just press SET.
SET
Direct voltage
Set VL-N to "254V" and then press SET. (+ − keys)
SET
CT primary current
Set to "200A" and then press SET. (+ − keys)
SET
Time constant for active power demand
The factory default setting is "0 second," so just press SET.
SET
Time constant for current demand
The factory default setting is "0 second," so just press SET.
SET
Setting menu
Set the setting menu number to "6" and then press SET.
SET

Note:
For more details about setting contents, refer to pages 13 to 32.

3.16 Examples of Simple Settings


Analog output specification
"4-20A" is displayed, so just press SET.
SET
Analog output 1 item
The factory default setting is "A_{AVG}," so just press SET.
SET
Analog output 1 detailes setup
This is "200.0A," so just press SET.
SET
Analog output 2 item
The factory default setting is "$V_{AVG\ (L\text{-}N)}$," so just press SET.
SET
Analog output 3 item
The factory default setting is "W∑," so just press SET.
SET
Analog output 3 detailed setup
This is "160.0kW," so just press SET.
SET
Analog output 3 detailed setup
The factory default setting is "Single deflection," so just press SET.
SET
Analog output 4 element
The factory default setting is "cosφ∑," so just press SET.
SET
Analog output 4 detailed setup
The factory default setting is "-0.5 to 1 to 0.5," so just press SET.
SET
Analog output limit
The factory default setting is "oFF," so just press SET.
SET
Pulse output 1
The factory default setting is "Active Energy (Imported)," so just press SET.
SET
Pulse output 1 pulse unit
Set to "1kWh/pulse" and then press SET. (+ − keys)
SET
Pulse width
The factory default setting is "0.125 second," so just press SET.
SET
Setting menu
Set the set-up menu number to "End" and then press SET.
SET
End screen
Press SET again. The changed setting are determined.
SET
Operation mode
Measurement begins according to the settings you changed.

4. Using Test Mode

Test mode includes functions that can be used for start-up of equipment.
The following table shows what can be done in the test mode.

Test menu	Description
1. Incorrect wiring determination support display	Displays the phase angle for the current/voltage and active energy/voltage/current for each phase. By confirming each displayed value, it is easier to determine whether there is incorrect wiring at connections for measurement (voltage/current) input.
2. Zero span adjustment for analog output	For functions with analog output, zero span adjustment can be done for analog output. Adjust this when matching with the receiver side and when output changes.
3. Analog output operation test	For functions with analog output, it is possible to confirm analog output operation without measurement (voltage/current) input. Use this for confirming connection with the receiver.
4. Pulse output operation test	For functions with pulse output, it is possible to confirm pulse output operation without measurement (voltage/current) input. Use this for confirming connection with the receiver.
5. Alarm output operation test	For functions with alarm output, it is possible to confirm alarm output (contact point output) without measurement (voltage/current) input. Use this for confirming connection with the contacted device.
6. Communication test	For models with a communication function, it is possible to monitor fixed numerical data without measurement (voltage/current) input. Use this for checking with the host system.

■Test Procedure

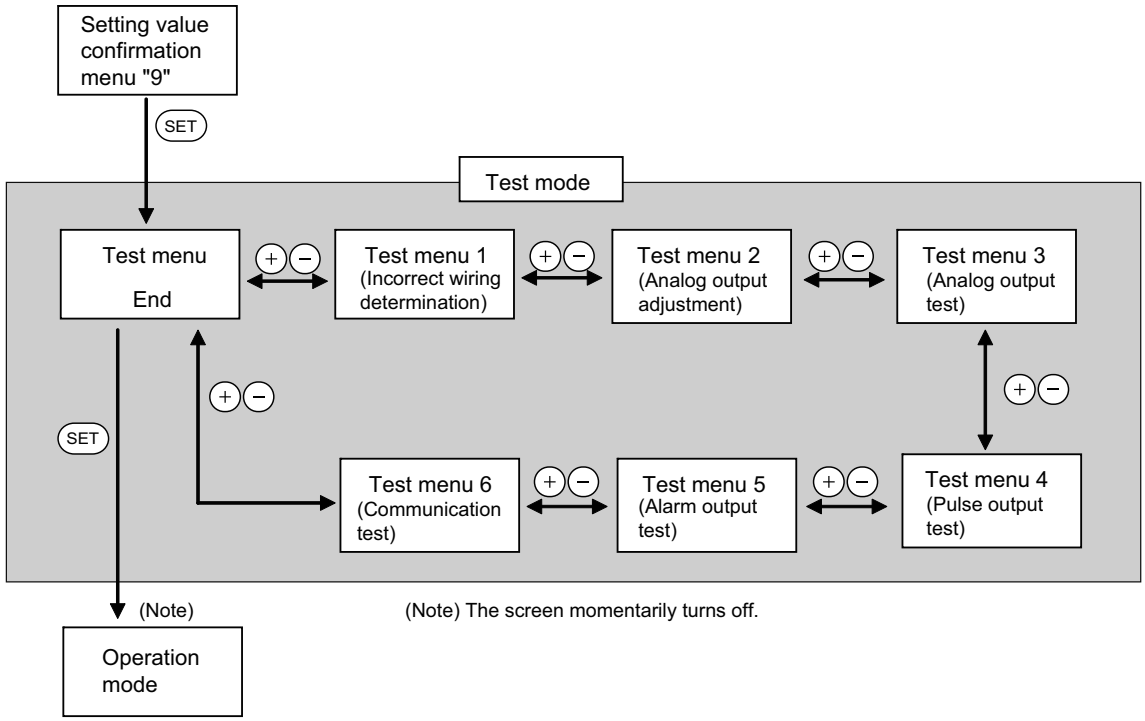
① Press (SET) for 2 seconds to move to the set value confirmation mode.

② Select setting value confirmation menu number "9" by (+) and (−)

③ Press (SET) to move to test mode.

④ Execute tests using each test menu. (Refer to pages 41 to 46)

■Test Mode Flow



(Note) The screen momentarily turns off.

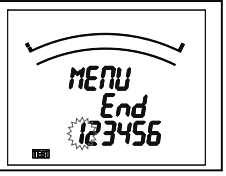
4. Using Test Mode

4.1 Test Menu 1: Incorrect Wiring Determination Support Display

In the setting value confirmation mode, when the menu number is set to "9", you will enter the test mode. (You cannot enter from the set-up mode.) The following operations are available in the test mode.

Test menu

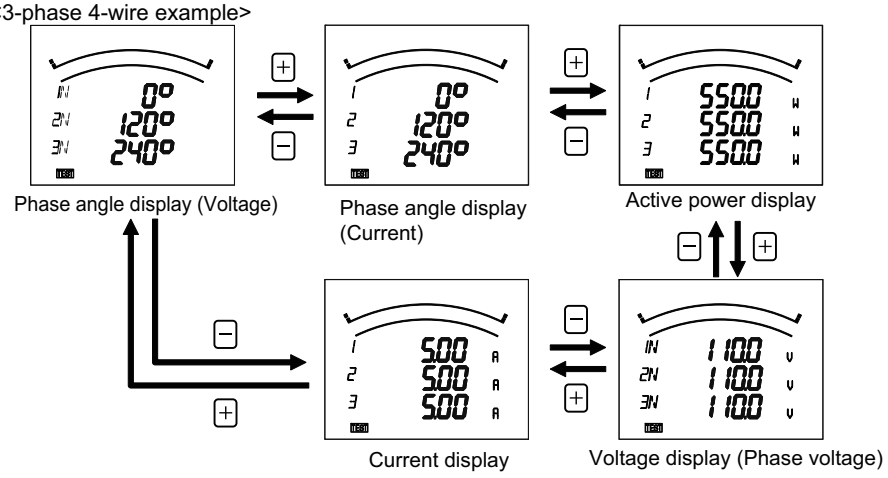
Set the test menu number to "1".



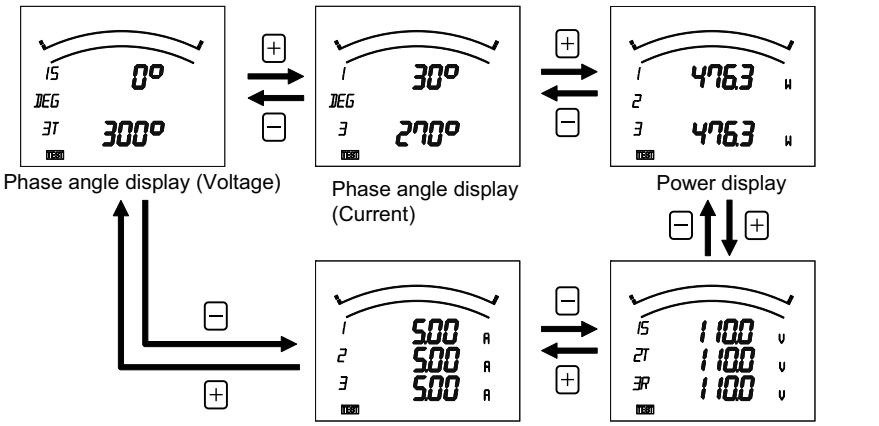
SET

① Incorrect wiring determination support display

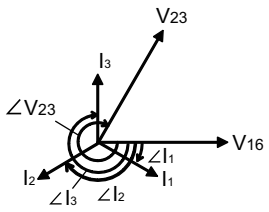
Phase angle display, active power display, voltage display, and current display are shown.
<3-phase 4-wire example>



<3-phase 3-wire example>



■About the phase angle
The phase angle is displayed clockwise based on V_{12} as the standard (0 degree).



∠V_{23} : Phase angle between V_{23} and V_{12}
∠I_1 : Phase angle between I_1 and V_{12}
∠I_2 : Phase angle between I_2 and V_{12}
∠I_3 : Phase angle between I_3 and V_{12}

Note: For 1-phase 3-wire, the phase needs to be read according to the following.
$V_{12} \rightarrow V_{1N}$
$V_{23} \rightarrow V_{2N}$ or V_{3N}
$I_3 \rightarrow I_2$ or I_3

■Display example of Incorrect wiring support function
For more information about display examples of each kind of Incorrect wiring, refer to pages 42 and 43.

SET

Test menu

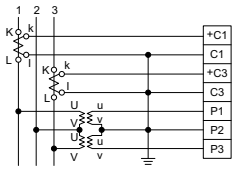
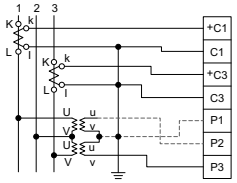
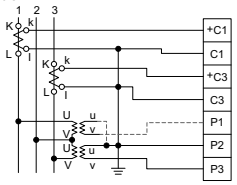
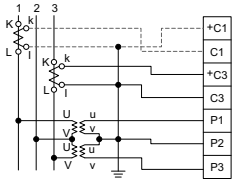
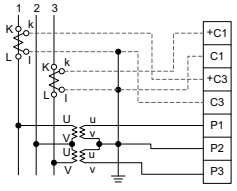
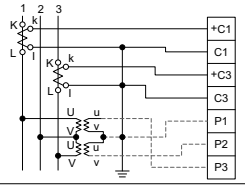
<To continue other test menu>
→ Select other test menu number and then press (SET).
<To close the test mode>
→ Select "End" as the test menu number and then press (SET).
You will return to the operation mode.

4.1 Test Menu 1: Incorrect Wiring Determination Support Display

■Display Example of Incorrect Wiring Support Function

Display example (Connection example for 3-phase 3-wire)

----- Incorrect Wiring Portion

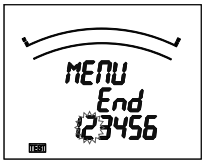
No.	Power Factor (Input)	Phase Angle Display				For Balanced Loading ($V_{12}=V_{23}$, $I_1=I_3$)								Connection
						Active Power Display		Voltage Display			Current Display			
		$\angle V_{12}$	$\angle V_{23}$	$\angle I_1$	$\angle I_3$	W_1	W_3	V_{12}	V_{23}	V_{31}	I_1	I_2	I_3	
Normal	LEAD 0.707	0	300	345	225	$W_1>W_3$		$V_{12}=V_{23}=V_{31}$			$I_1=I_2=I_3$			
	LEAD 0.866			0	240									
	1.000			30	270	$W_1=W_3$								
	LAG 0.866			60	300	$W_1<W_3$								
	LAG 0.707			75	315									
1	LEAD 0.707	0	60	165	45	W_1=Negative value		$V_{12}=V_{23}=V_{31}$			$I_1=I_2=I_3$			When the P1 terminal and P2 terminal are reversed 
	LEAD 0.866			180	60									
	1.000			210	90	W_3=Positive value								
	LAG 0.866			240	120									
	LAG 0.707			255	135									
2	LEAD 0.707	0	120	165	45	W_1=Negative value		$V_{12}=V_{23}<V_{31}$			$I_1=I_2=I_3$			When VT connection is reversed at side 1 
	LEAD 0.866			180	60									
	1.000			210	90	W_3=Positive value								
	LAG 0.866			240	120									
	LAG 0.707			255	135									
3	LEAD 0.707	0	300	165	225	W_1=Negative value		$V_{12}=V_{23}=V_{31}$			$I_1=I_3<I_2$			When CT connection is reversed at side 1 
	LEAD 0.866			180	240									
	1.000			210	270	W_3=Positive value								
	LAG 0.866			240	300									
	LAG 0.707			255	315									
4	LEAD 0.707	0	300	225	345	W_1=Negative value		$V_{12}=V_{23}=V_{31}$			$I_1=I_2=I_3$			When CT at side 1 and side 3 are switched 
	LEAD 0.866			240	0	W_3=Positive value								
	1.000			270	30	$W_1=W_3=0$								
	LAG 0.866			300	60	W_1=Positive value								
	LAG 0.707			315	75	W_3=Negative value								
5	LEAD 0.707	0	300	225	105	W_1=Negative value		$V_{12}=V_{23}=V_{31}$			$I_1=I_2=I_3$			When VT terminals are connected to the P1, P2, and P3 terminals of the measurement instrument according to the order P2, P3, and P1 respectively 
	LEAD 0.866			240	120	W_3=Negative value								
	1.000			270	150	$W_1=0$ W_3=Negative value								
	LAG 0.866			300	180	W_1=Positive value								
	LAG 0.707			315	195	W_3=Negative value								

4.2 Test Menu 2: Zero Span Adjustment for Analog Output (ME110SSR-4AP, -4APH, -4A2P)

The following operations are available in the test mode.

Test menu

Set the test menu number to "2".



DISPLAY SET

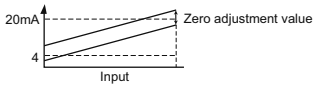
① Analog output CH1 zero adjustment

Execute zero adjustment for analog output CH1.

Possible setting range : -50 to ±0 to +50

〔 Adjustment is possible up to about ±0.3mA 〕

■ Zero adjustment movement



Note: For zero adjustment, set the measurement input to zero.

DISPLAY SET

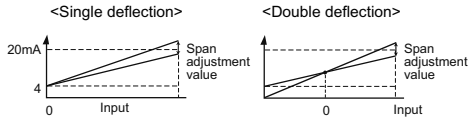
② Analog output CH1 span adjustment

Execute span adjustment for analog output CH1.

Possible setting range : -50 to ±0 to +50

〔 Adjustment is possible up to about ±0.3mA 〕

■ Span adjustment movement



Note: For span adjustment, measurement input is necessary.

DISPLAY SET

③ Analog output CH2 to CH4 zero adjustment

Execute zero adjustment for analog output CH2 to CH4.

The adjustment method is the same as ①Analog Output CH1 Zero Adjustment.

DISPLAY SET

④ Analog output CH2 to CH4 span adjustment

Execute span adjustment for analog output CH2 to CH4.

The adjustment method is the same as ②Analog Output CH1 Span Adjustment.

SET

Test menu

<To continue other test menu>

→ Select other test menu number and then press (SET).

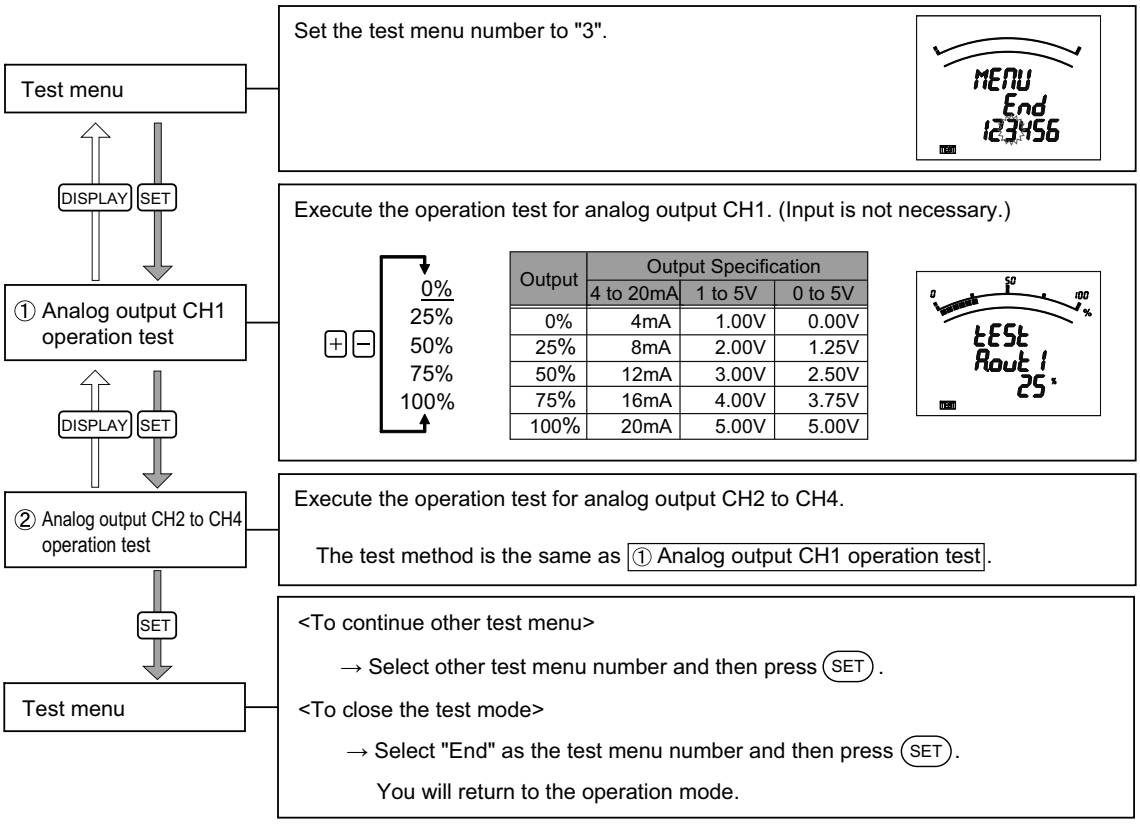
<To close the test mode>

→ Select "End" as the test menu number and then press (SET).

You will return to the operation mode.

4.3 Test Menu 3: Analog Output Operation Test (ME110SSR-4AP, -4APH, -4A2P)

The following operations are available in the test mode.



4. Using Test Mode

4.4 Test Menu 4: Pulse Output Operation Test (ME110SSR-4AP, -4APH, -4A2P)

The following operations are available in the test mode.

Test menu

DISPLAY SET

① Pulse output CH1 operation test

DISPLAY SET

② Pulse output CH2 operation test

SET

Test menu

Set the test menu number to "4".

Execute the operation test for pulse output CH1.
(Input is not necessary.)
When RESET is pressed, 1 pulse is output.

Note: Output is executed according to the set pulse width.

0 → 1 → 2 → ··· → 49 → 50 [pulse]

The number of output pulses is displayed. After reaching 50, the counter returns to 1.

Execute the operation test for pulse output CH2. (ME110SSR-4A2P only)

The test method is the same as ①Pulse Output CH1 Operation Test.

<To continue other test menu>
→ Select other test menu number and then press (SET).

<To close the test mode>
→ Select "End" as the test menu number and then press (SET).
You will return to the operation mode.

4.5 Test Menu 5: Alarm Output Operation Test (ME110SSR-4APH, -CH)

The following operations are available in the test mode.

Test menu

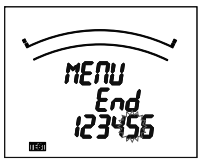
DISPLAY SET

① Alarm output operation test

SET

Test menu

Set the test menu number to "5".

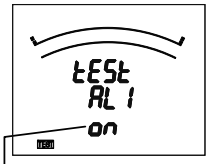


Execute the alarm output operation test.
When RESET is pressed for 2 seconds, contact output is switched back.

RESET Press for 2 seconds

oFF ⟷ on
(Open) (Close)

Note:
To return to the test menu, turn contact output OFF (open).



The current output status is displayed.

<To continue other test menu>
→ Select other test menu number and then press (SET).

<To close the test mode>
→ Select "End" as the test menu number and then press (SET).
You will return to the operation mode.

4.6 Test Menu 6: Communication Test (ME110SSR-C, -CH, -MB)

The following operations are available in the test mode.

Test menu

Set the test menu number to "6".

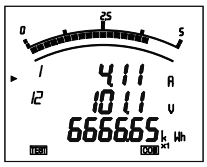
DISPLAY SET

Execute communication test operation.
(Values other than zero can be monitored even when the voltage and current are not input.)

■Monitor value by communication

- Values displayed on the screen,can be minitored.
- Measurement elements not displayed on the screen are zero.
  (only power factor is 1.000).
- When DI1 to DI3 are used, it is also possible to monitor the digital input status.

■Display screen



- As with the operation mode, it is displayed according to settings such as the display pattern.
- The maximum/minimum value can be displayed. (Cyclic display cannot be executed.)

① Communication test

■Key operation

Operation	Function
Press (DISPLAY)	Switches the display screen.
Press (PHASE)	Switches the phase.
Press (MAX/MIN)	Moves or returns to the maximum/minimum value screen.
Press ⊕ or ⊖	Switches the analog bar graph element.
	Switches the harmonic degree (when harmonics screen is displayed).
Press ⊕ and ⊖ together for at least 2 seconds.	Moves or returns to the lower digit magnification display for Wh and varh.
Press (SET)	Return to the test menu.

Note: The latch state can only be cancelled by command via communication.
Note: When executing a communication test, please read the following manual in addition to this instruction manual. (For more information refer to page 80.)

- Electronic Multi-Measuring Instrument Programming Manual (CC-Link)
- Electronic Multi-Measuring Instrument ModBus I/F Specification

SET

<To continue other test mode>

→ Select other test menu number and then press (SET).

Test menu

<To close test mode>

→ Select "End" as the test menu number and then press (SET).

You will return to the operation mode.

5. Operation

5.1 Basic Operation

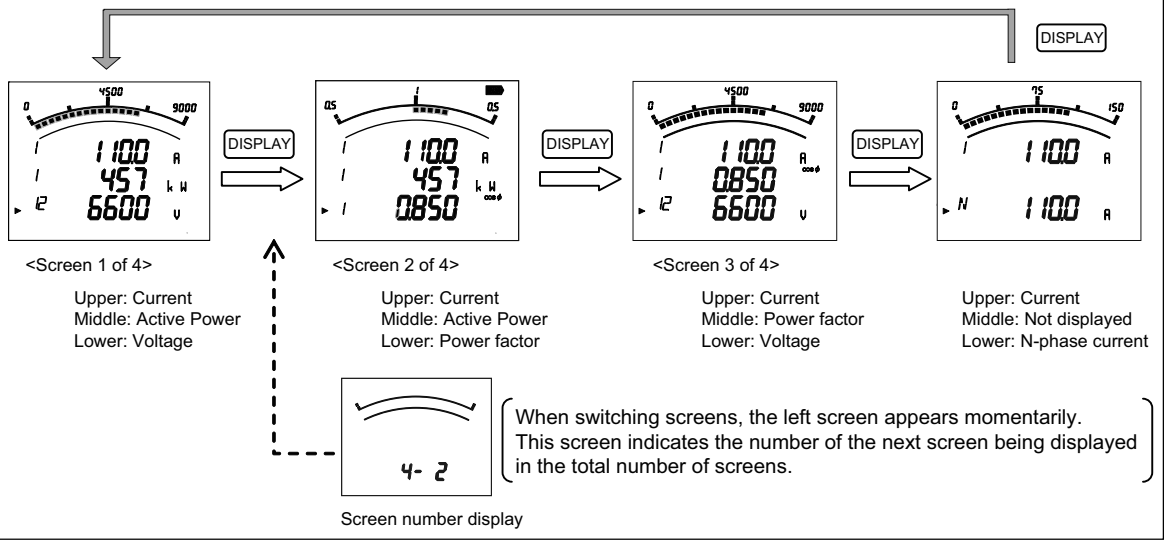
The following explains basic usages during operation.

●Switch display

By pressing (DISPLAY), the measurement display will switch over.

Display items and the order differ depending on the phase wire method setting display pattern settings and additional screen. For more information about detailed display patterns, refer to pages 58 and 59.

Example of display switching (display pattern: P01)



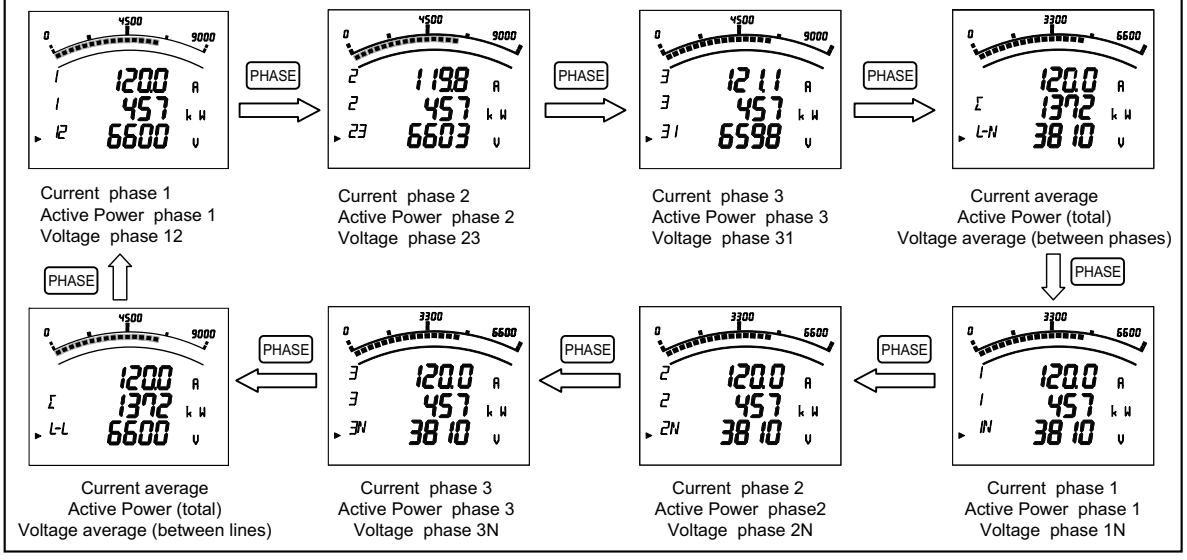
When switching screens, the left screen appears momentarily. This screen indicates the number of the next screen being displayed in the total number of screens.

●Switch phase

By pressing (PHASE), the current phase and the voltage phase will switch over.

The phase cannot be switched in the following cases.
- Measurement elements without phase (Frequency)
- Active Power, reactive power, and power factor for settings other than 3-phase 4-wire
- When the setting is 1-phase 2-wire
- The measurement elements for Upper, middle, and Lower are the same

Example of phase switching (Phase wire System: 3P4W)

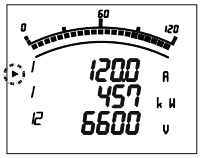


5. Operation

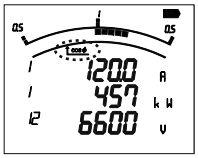
5.1 Basic Operation

●Bar graph display

Bar graph displays the measurement element indicated with " ▶ " or " ↑ ".



(Example) Upper element (A) displayed on bar graph



(Example) cosφ displayed on bar graph

●Switching measurement factors displayed on bar graphs

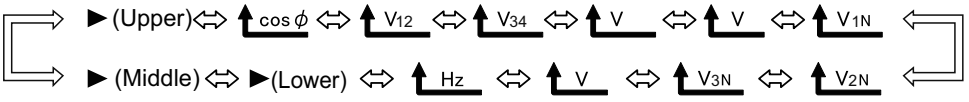
Press the ⊕ or ⊖ key to switch.

The power factor, voltage, and frequency can be displayed in the bar graph even if they are not set in the display pattern.

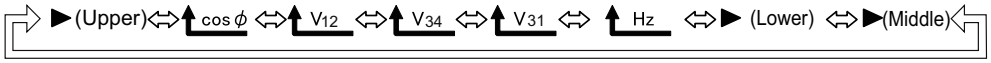
The bar graph cannot be displayed in the following cases.
- When electric energy / reactive energy are selected
- When a line without measurement display is selected
- Harmonics Display Screen

For 3-phase 4-wire

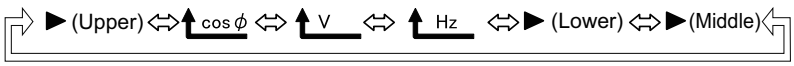
⊕ (Clockwise rotation) ⊖ (Counterclockwise rotation)



For 3-phase 3-wire, 1-phase 3-wire



For 1-phase 2-wire



●Cyclic Display

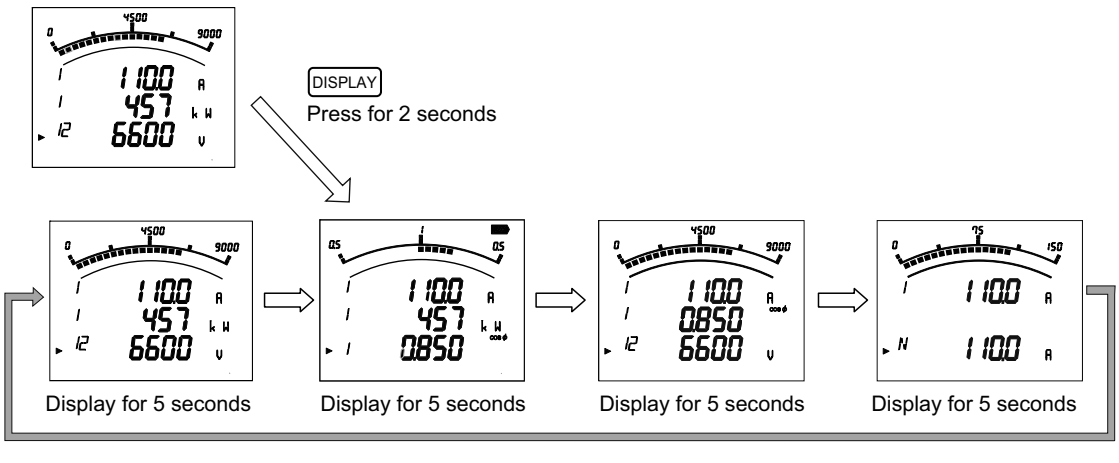
In cyclic display, display and phases automatically change at every 5 seconds.

When (DISPLAY) is pressed for about 2 seconds, the cyclic display appears.

When (PHASE) is pressed for about 2 seconds, the cyclic phase appears.

Note 1: Before shifting to the cyclic display change screen, the display flickering 3 times.
Note 2: By pressing any other key than the (SET) and the (RESET) it goes back to manual change.
Note 3: In the maximum value and the minimum value display, cyclic display is not available.
Note 4: In the cyclic display, drawing number is not displayed.

Example Cyclic Display (Display Pattern: P01)



5. Operation

5.1 Basic Operation

●Harmonics display

Harmonic RMS value and distortion ratio can be displayed.

It is necessary to set the harmonics display settings before displaying.(Refer to page 20)

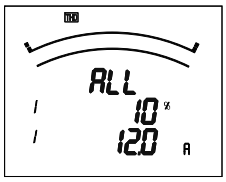
■Measurement items

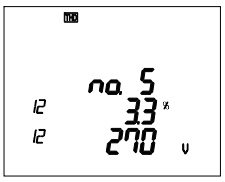
Degree	Harmonic current		N-phase harmonic current		Harmonic voltage	
	RMS value	Distortion ratio	RMS value	Distortion ratio	RMS value	Distortion ratio
Harmonic total	○	○	○	-	○	○
1st	○	-	○	-	○	-
3rd	○	○	○	-	○	○
5th	○	○	○	-	○	○
7th	○	○	○	-	○	○
9th	○	○	○	-	○	○
11th	○	○	○	-	○	○
13th	○	○	○	-	○	○

Note 1: When the fundamental harmonic is 0, the distortion ratio are displayed as 0%.

■Harmonic display examples

<Example of harmonic current total display> <Example of harmonic voltage 5th display>



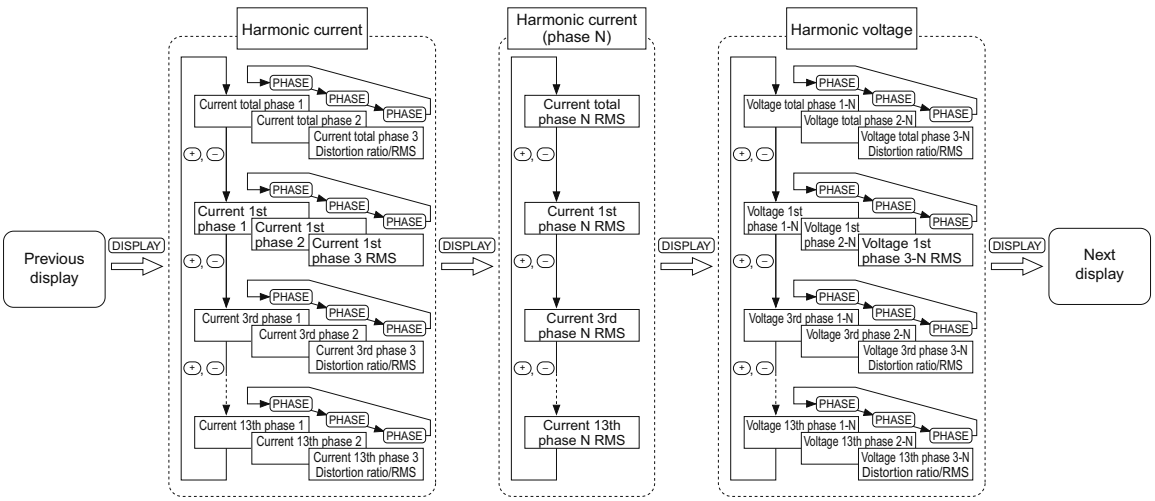


Upper: Degree
Middle: Distortion ratio
Lower: RMS value

Note : Harmonic total is shown by “ALL”.

■Switching degree / phase

Press the ⊕ or ⊖ key to switch the degree. Press (PHASE) to switch phases.



Note: For harmonic measurement, the following phases are not displayed.

Phase wire system		Harmonic current	Harmonic voltage
3-phase 3-wire	3CT	-	phase 31
	2CT	phase 2	phase 31
1-phase 3-wire	1N2 display	phase N	phase 12
	1N3 display	phase N	phase 31

5. Operation

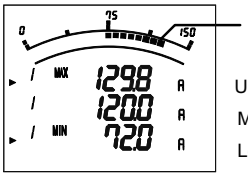
5.1 Basic Operation

●Maximum value and minimum value display

For the maximum / minimum value display screen, the maximum value, current value, and minimum value for each measurement item are displayed on one screen.

(However, for harmonics only the following maximum values are displayed.
Harmonic current: Total, 1st, 3rd, 5th, 7th, 9th, 11th, and 13th effective values for where the phase was largest for each phase
Harmonic voltage: Total distortion factor, 1st effective value, 3rd, 5th, 7th, 9th, 11th, and 13th content factors for where the phase was largest for each phase)

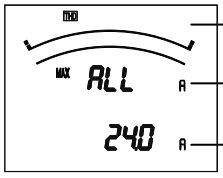
■Example Display



The bar graph turns on only between the maximum value and minimum value.

Upper: Maximum value
Middle: Current value
Lower: Minimum value

For Current



Harmonics won't display as bar graph.
Harmonic degree
Maximum value

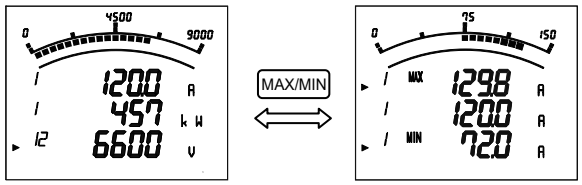
For Harmonic current

●Display of maximum value and minimum value

When (MAX/MIN) is pressed, the display is changed into the maximum value and minimum value display.

And when (MAX/MIN) is pressed, the display changes back to the present value display.

Example of switching between present value display and maximum/minimum value display



Present value display

Maximum value and minimum value display

On maximum/minimum value display, the following operation is also possible as current value display.

Key operation	Function
Press (DISPLAY)	Measurement items switch according to the following order. However, measurement items that are not included in the phase wire method display pattern setting and additional screens are not displayed. A→AN→DA→DAN→V→W→DW→var HV←HIN←HI←Hz←cosφ←VA (AN: N-phase current, DA: Demand current, DAN: N-phase demand current, DW: Demand power, HI: Harmonic current, HIN: N-phase harmonic current, HV: Harmonic voltage)
Press (PHASE)	3-phase 4-wire: A and DA switch as Average→1 Phase→2 Phase→3 Phase V switchs as $V_{AVG(L-N)}$→V_{1N}→V_{2N}→V_{3N}→$V_{AVG(L-L)}$→V_{12}→V_{23}→V_{31} W, DW, var, VA, and cosφ switch as Total RMS value→1-phase→2-phase→3-phase AN, DAN, and Hz do not have phase switching. 3-phase 3-wire, single-phase 3-wire: Phase for A, DA, and V switch. single-phase 2-wire: No phase switch.
Press (+) or (−)	The harmonic degree switch. (Only for harmonics display)
Press (DISPLAY) for 2 seconds	Switches to measurement item cyclic display.
Press (PHASE) for 2 seconds	Switches to phase cyclic display.

●Clear the maximum/minimum value

On the maximum/minimum value display screen, press the (RESET) for 2 seconds to clear the maximum/minimum value for the displayed measurement item to the present value.
On the maximum/minimum value display screen, press the (+) and (RESET) together for 2 seconds to clear all maximum/minimum values to the present value.

5. Operation

5.1 Basic Operation

●Active Energy / Reactive Energy Display

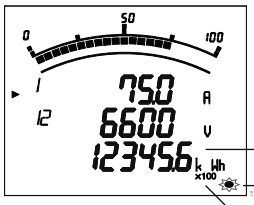
■Display format

The following table shows the display format of active energy / reactive energy based on the total load [kW].

$$\text{Total load power[kW]} = \frac{\alpha \times (\text{VT primary voltage}) \times (\text{CT primary current})}{1000}$$

α: 1 1-phase 2-wire
2 1-phase 3-wire
$\sqrt{3}$ 3-phase 3-wire
3 3-phase 4-wire

*1. For the 1-phase 3-wire setting, the VT primary voltage is calculated using 110V.
*2. For the direct voltage setting, the direct voltage is used for calculation instead of the VT primary voltage.
*3. For the 3-phase 4-wire setting, the VT primary voltage and direct voltage are calculated using the phase voltage.
*4. For reactive energy, the above kW is read as kvar, and kWh is read as kvarh.



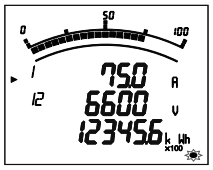
Electric energy measurement value
Metering status
Multiplier

Total load [kW]	Display type		
	Digital display	Multiplier	Unit
Less than 10	8888.88	×1	kWh kvarh
10 or higher and less than 100	88888.8	×1	
100 or higher and less than 1000	88888.8	×10	
1000 or higher and less than 10000	88888.8	×100	
10000 or higher and less than 100000	88888.8	×1000	
100000 or higher	88888.8	×10000	

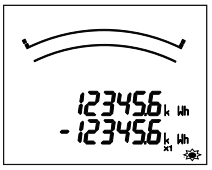
The metering ststus blinks while the active energy is being counted.
(Only the incoming active energy display screen)
When active energy is not counted, turns ON or OFF.

The actual measurement value is
"Measurement value = Digital display value × Multiplier".

■Example Display



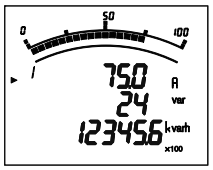
Active energy (Imported)



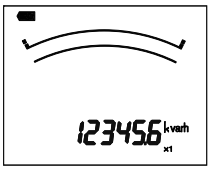
Active energy (Exported)

Active energy (exported) is also displayed on the active energy (importeding) display screen.

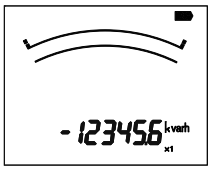
Middle: Active energy (Imported)
Lower: Active energy (Exported)



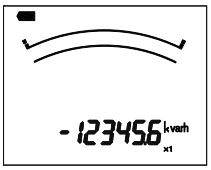
Reactive energy (Imported lag)



Reactive energy (Imported lead)



Reactive energy (Exported lag)

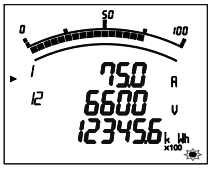


Reactive energy (Exported lead)

●Enlarged 3 digital figures

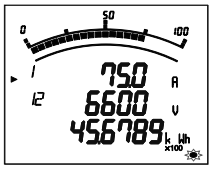
When (+) and (−) are pressed simultaneously for 2 seconds, values of active energy and reactive energy are enlarged by 3 figures.
This can be used for confirming the active energy measurement.
It will automatically return to normal display if no button is pressed for 5 minutes or when switchs to cyclic display.

Note 1:This function is made only on active energy and reactive energy displayed.



Normal display

(+) + (−)
Press simultaneously for 2 seconds



Lower digit magnification display

Normal Display

Enlaged 3 digital figuness Display

●Wh and varh zero reset

When (SET), (RESET), and (PHASE) are pressed simultaneously for 2 seconds, the measured values of active energy (Wh) and reactive energy (varh) will be reset.(This is effective only in the instaneous value Display.)

Note 1: All of active energy (Wh) and reactive energy (varh) not displayed are will be reset.

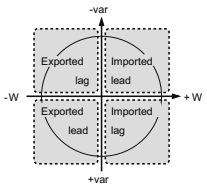
5. Operation

5.1 Basic Operations

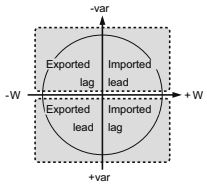
●Reactive energy counting method (2 quadrant counting / 4 quadrant counting)

There are the following two types of quadrants for counting reactive energy.

<4 quadrant counting >



<2 quadrant counting>

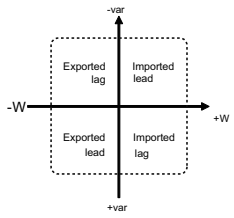


The measurement method for reactive electric energy is switched using "Expanded counting" in the Set-up Menu 3. (Refer to page 20.)

Counting method	Description
4 quadrant counting	It is counting (Imported lag), (Exported lead),(Imported lead) and (Exported lag) respectively as division of one.In general, it is counted by this method. However, at the boundary of each division, there is a dead region. It is suitable for the counting of equipment with the private electric generator.
2 quadrant counting	(Imported lag) and (Exported lead) are counted as division of one. (Imported lead) and (Exported lag) are counted as division of one. The dead region is made only nearby var=0 (power factor = 1). Therefore, because the dead region is not made nearby power factor = 0. It is suitable for the counting of equipment without the private electric generator and the reactive power of the capacitor load at the power factor = 0, generally.

●Each measurement item display during power transmission

The following table shows the symbol display (±) for each measurement value according to the power reception / power sending status.

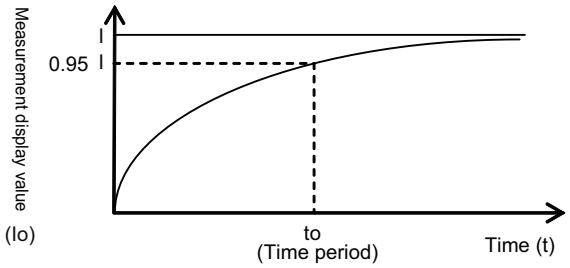


Measured items \ Quadrant		Imported Lag	Imported Lead	Exported Lag	Exported Lead
A,DA,V,VA,Hz,HI,HV		Unsigned	Unsigned	Unsigned	Unsigned
D,DW		Unsigned	Unsigned	" − "sign	" − "sign
ver, cos ϕ	For 2 quadrant counting	Unsigned LAG display*	" − "sign LEAD display*	" − "sign LEAD display*	Unsigned LAG display*
	For 4 quadrant counting	Unsigned LAG display*	" − "sign LEAD display*	Unsigned LAG display*	" − "sign LEAD display*

* Turns on when displayed on the bar graph.

●Demand time and demand value

The demand time (t_o) is the time until the measurement display value (I_o) displays 95% of the input (I) when a certain constant input (I) is given. To display 100% of the input (I), about three times more than the time (t_o) is needed.



The demand value is the measurement display value with the above time characteristics, and it shows the overall average within the demand time.

The demand value changes over a relatively long time, so it is not affected by input changes within a short time. Therefore, this is good for monitoring transformer overload.

(Note: The active power demand measured by this measurement instrument is not for power demand managemer

5.2 Usage According to Purpose

The following explains usage according to the purpose during operation.

●Display and operation of the upper/lower limit alarm

When the value exceeds the upper or lower limit setting value set in advance,the display flickers and alarm can be output. (For more information about how to set the upper/lower limit alarm, refer to pages 22 and 23.)

■Alarm indicator

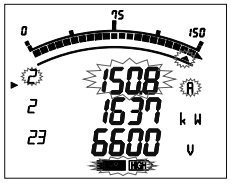
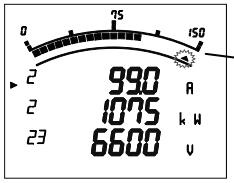
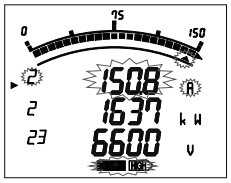
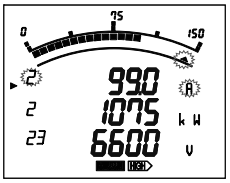
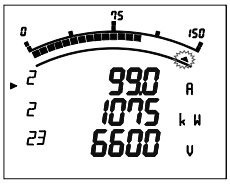
When the measurement element with an upper/lower limit alarm is displayed on the bar graph, "▲" flickers on the bar graph to indicate the upper/lower limit.

■Behavior During Alarm Generation

Alarm condition: When measurement value exceeds alarm value, display flicker and an alarm contact closes.

Alarm cancel: When alarm is canceled,display flickers normally and alarm contact opens.

Note: When the alarm delay time is set, an alarm is generatde only when the alarm value is continuously beyond the upper/lower limit alarm value for the delay time.

<table>
<tr><th colspan="2">Alarm cancel method</th><th>Measurement value ≥ Upper limit value
(or Measurement value ≤ Lower limit value)</th><th>Measurement value < Upper limit alarm value
(or Measurement value > Lower limit alarm value)</th><th></th></tr>
<tr><td rowspan="2">Automatic
(Auto)</td><td>Display</td><td>ALARM, HIGH or LOW blinks
  </td><td>Normal display
  </td><td>Upper/lower limit indicator</td></tr>
<tr><td>Output (Alarm relay contact)</td><td>Closed</td><td>Opened</td><td></td></tr>
<tr><td rowspan="2">Manual
(HoLd)</td><td>Display</td><td>ALARM, HIGH or LOW flickers
 
(Alarm generation)</td><td>ALARM, HIGH or LOW turns ON
 
(Alarm retention)</td><td>RESET
Normal display
 
(Alarm cancellation)</td></tr>
<tr><td>Output (Alarm relay contact)</td><td>Closed</td><td>Closed</td><td>Opened</td></tr>
</table>

Note 1: When the measurement element where the alarm generated exists on the display screen, the display for the digital value, unit (A, V, W, var, cosφ, Hz, %, Demand), and phase (1, 2, 3, N) will be based on the alarm status according to the following table. If it does not exist on the display screen, it does not flicker.

Alarm status	Digital value	Unit	Phase
Alarm generation	Flickering	Flickering	Flickering*
Alarm retention	On	Flickering	Flickering*
Alarm cancellation	On	On	On

* Does not flicker when displaying phases where no alarm occurred.

Note 2: When the backlight flickering setting is set to ON (flicker) during alarm generation, the backlight also flickers when an alarm is generated.

Note 3: On the maximum/minimum value display screen, the present value (middle of the digital display) and ALARM , HIGH or LOW blinks.

Note 4: Alarm contact is the batch output of the set alarm.

■Monitoring phase for upper/lower limit alarm element

The phase that monitors the upper/lower limit alarm differs according to the measurement item. For more details, refer to the following table.

Upper/lower limit alarm element	Monitored phase			
	3P4W	3P3W (3CT, 2CT)	1P3W (RNS)	1P3W (RNT)
Upper limit current, current demand	1, 2, 3	1, 2, 3	1, N, 2	1, N, 3
Lower limit current, current demand	1, 2, 3	1, 2, 3	1, 2	1, 3
Upper limit N-phase current, N-phase current demand	N	-	-	-
Lower limit N-phase current, N-phase current demand	N	-	-	-
Upper limit voltage (L-L) (Note 1)	12, 23, 31	12, 23, 31	1N, 2N, 12	1N, N3, 31
Lower limit voltage (L-L) (Note 1)	12, 23, 31	12, 23, 31	1N, 2N, 12	1N, N3, 31
Upper limit voltage (L-N)	1N, 2N, 3N	-	-	-
Lower limit voltage (L-N)	1N, 2N, 3N	-	-	-
Upper limit power, demand active power, active power demand, power factor	Σ	Σ	Σ	Σ
Lower limit power, demand active power, active power demand, power factor	Σ	Σ	Σ	Σ
Upper limit frequency	1	1	1	1
Lower limit frequency	1	1	1	1
Harmonic current total RMS value	1, 2, 3	1, 2, 3 Note 2	1, 3	1, 3
Harmonic voltage total distortion ratio	12, 23, 31	12, 23	1N, 2N	1N, N3
Harmonic current total RMS value N-phase	N	-	-	-

Note1:For phase 12 (or phase 31) at 1-phase 3-wire, alarm monitoring is executed using a value that is two times the set upper/lower limit alarm value.

Note2:Only 3P3W (3CT) is measured for the phase 2 harmonic current.

5.2 Usage According to Purpose

●Canceling the upper/lower limit alarm

The alarm cancellation method differs depending on the setting for alarm reset.

Alarm cancel method	Cancelation method
Automatic (Auto)	When the measurement value is below the upper/lower limit set value, the alarm is automatically reset.
Manual (HoLd)	The alarm is maintained even after the measurement value is below the upper/lower limit set value. After the measurement value is below the upper/lower limit alarm value, operate the following alarm cancellation operation. (Note: However, alarms cannot be cancelled from the maximum/minimum value display screen, or the digital input screen.) <Cancelling alarms for selected elements> Display the element where the alarm generated, and then press (RESET) to cancel the alarm. (When an element has a phase such as current and voltage, it is necessary to press (RESET) for each phase when cancelling an alarm.) <Cancelling alarms for all elements> At the current value display screen, press (RESET) for 2 seconds to cancel all alarms.

Note: The difference of 0.8% between the maximum scale and alarm value is used for determining whether the measurement value is below the upper/lower limit alarm value in order to prevent chattering.

●Stopping backlight flickering caused by upper/lower limit alarm generation

Press the (RESET) key to stop the backlight flickering.

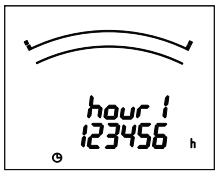
●Operation time display

The amount of time of current measurement is counted and is displayed as the load operation time. It is necessary to execute operation time display settings for displaying. Immediately after the operation time display is set to "on," the operation time timer begins. When set to "oFF," the timer does not operate.
(About operation time display settings, refer to page 32.)

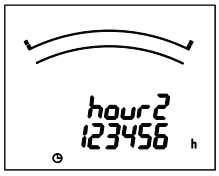
When the measurement value for the current phase1 is not zero, Operation Time 1 and Operation Time 2 are counted.

<Using Operation Time 1 and Operation Time 2>

To view both the monthly operation time (periodically, operating time values are cleared) and the operation time after starting equipment operation (values not cleared periodically), use Operation Time 1 and Operation Time 2 selectively. If this is not necessary, monitor either of them.



Operation Time 1



Operation Time 2

Press the (DISPLAY) key on the present value display screen to switch the displayed measurement screen.

●Clearing the operation time

Display Operation Time 1 or Operation Time 2 on the screen, and then press (RESET) for 2 seconds to clear the operation time to zero.
(Only the operation time being displayed will be cleared.)

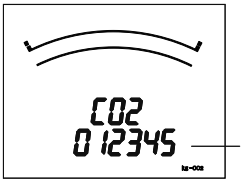
5.2 Usage According to Purpose

●CO_2 emission display

CO_2 emissions converted from active energy (imported) can be displayed. It is necessary to set CO_2 emission display settings for displaying.
(About setting, refer to page 32.)

The following table shows the display format for CO_2 emission based on the total load power.

Total load power [kW]	Display format	
	Digital display	Unit
Less than 10	8888.88	kg
10 or higher and less than 100	88888.8	kg
100 or higher and less than 1000	888888	kg
1000 or higher and less than 10000	8888.88	t
10000 or higher and less than 100000	88888.8	t
100000 or higher	888888	t



CO_2 emission

Note: CO_2 emissions are calculated using "CO_2 emission = Active energy (imported) × CO_2 conversion factor setting value."
This is not an counted value, so the CO_2 emission value changes when the CO_2 conversion factor is changed.

Press the (DISPLAY) key on the current value display screen to switch the displayed measurement screen.

●Clearing the CO_2 emission value

When active energy is cleared to zero, the CO_2 emission value is also cleared.
It is not possible to clear only the CO_2 emission value.
(About clearing the active energy to zero, refer to page 51.)

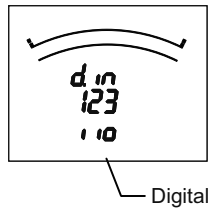
5.2 Usage According to Purpose

●Display and operation of the digital input status

It is possible to input the open/closed signal of the circuit breaker and alarm signal of the overcurrent relay to terminals DI1 to DI3 (ME110SSR-CH only) to display the digital input status. It is necessary to set the digital input status display (digital input DI1 to DI3) in advance in order to display.
(About settings, refer to page 30.)

■Example display

Digital input screen (DI1 to DI3)



Digital input status

0 : digital input is opened
1 : digital input is closed

Press (DISPLAY) on the current value display screen to switch the displayed measurement screen.

■Digital input reset method

The method for maintaining the digital input status differs according to the digital input reset method.

Contact point input reset method	Cancelation method
Auto reset (Auto)	If the digital input turns OFF (Open), the digital input status automatically turns OFF (Open).
Latch (HoLd)	After it is detected that the digital input is ON (Closed), the digital input status is kept ON (Closed) until executing latch cancelation, even when the contact point input turns OFF (Open). For the latch cancellation method, refer to the following. (When alarm contact such as ACB are input, alarm generation status continues on this measurement instrument even when an alarm generation stops so that an alarm cannot be missed.)

<Cancelling digital input latch>

From the digital input screen (DI1 to DI3), press (RESET) for 2 seconds to cancel all latches for the digital inputs (DI1 to DI3).

■Digital input conditions

The following are the digital input conditions.

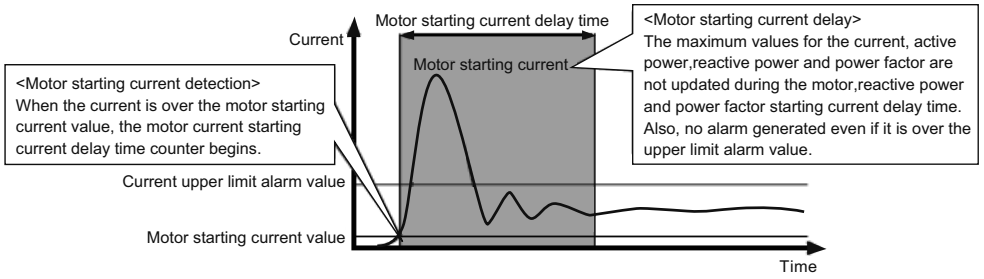
Input conditions	Terminals DI1 to DI3
Rating	DC19-30V 7mA or less
ON (Closed) / OFF (Open) time	30ms or longer for both ON and OFF

5.2 Usage According to Purpose

●Preventing maximum value update by motor starting current

When the motor current is monitored, use the motor starting current delay function to prevent maximum value update and alarm generation for the current, active power, reactive power, and power factor due to the motor starting current. It is necessary to set in advance to use the motor starting current delay function.
(About settings, refer to page 24.)

■Movement when the motor starting current delay function is used



Note 1: Set the motor starting current value to a value lower than the lower limit value considering changes in the load current during operation.
Note 2: When the input current is below the motor starting current value, the minimum value update stops.

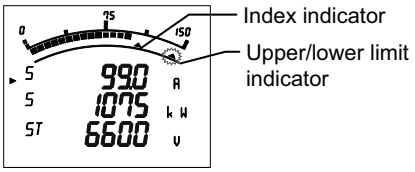
●Index indicator display

The index indicator can be displayed on the bar graph.

■Display description

"▲" turns on for the index indicator.

(Note: "▲" flicker for the upper/lower limit indicator.)



■How to display

It is necessary to set the index indicator in advance. For more information about settings, refer to page 21.

6. Other

6.1 Display Pattern Contents

When the display pattern in the Setting menu 1 and the additional screen in the Setting menus 3, 7, and 8 are set, pressing (DISPLAY) changes the screens shown in the table below from the left to the right.

[For 3-phase 4-wire]

Display pattern		Screen set by display pattern									Additional display (Set in the set-up menus 3, 7, 8)										
		No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	No.17	No.18	No.19	No.20
											Exported active energy	Imported reactive energy (Lead)	Exported reactive energy (Lag)	Exported reactive energy (Lead)	Harmonic current	Harmonic current N-phase	Harmonic voltage	DI status (3DI)	Operation time 1	Operation time 2	CO_2 emission
P01	Upper	A	A	A	A										Degree	Degree	Degree	d.in	-	-	-
	Middle	W	W	cosφ	-										Ratio	-	Ratio	1 2 3	hour1	hour2	CO_2
	Lower	V	PF	V	A_N										RMS value	RMS value	RMS value	status	Operation time	Operation time	Emission
P02	Upper	A	A	A	A						-				ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	W	cosφ	-						Wh										
	Lower	Wh	Wh	Wh	A_N						Exported active energy										
P03	Upper	A	A	A	A	A	A								ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	cosφ	cosφ	cosφ	cosφ	cosφ	-														
	Lower	V	W	var	VA	Hz	AN														
P04	Upper	A	A	A	A	A	A	A			-	-	-	-	ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	W	var	VA	cosφ	Hz	-			Wh	-	-	-							
	Lower	Wh	Wh	varh	Wh	Wh	Wh	AN			Exported active energy	Exported active energy (Lead)	Exported active energy (Lag)	Exported active energy (Lead)							
P05	Upper	cosφ	Hz	VA											ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	W	W	W																	
	Lower	var	var	var																	
P06	Upper	A_1	V_{1N}	A	A										ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	A_2	V_{2N}	-	-																
	Lower	A_3	V_{3N}	V	A_N																
P07	Upper	A	A_1	V_{1N}	A										ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	A_2	V_{2N}	-																
	Lower	W	A_3	V_{3N}	A_N																
P08	Upper	A	A	A_1	V_{1N}	A					-				ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	W	A_2	V_{2N}	-					Wh										
	Lower	Wh	Wh	A_3	V_{3N}	A_N					Exported active energy										
P09	Upper	A	A_R	DA_1	V_{1N}	A	DA								ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	A_S	DA_2	V_{2N}	-	-														
	Lower	V	A_T	DA_3	V_{3N}	A_N	DA_N														
P10	Upper	A	A	A_1	DA_1	V_{1N}	A	DA							ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	DA	A_2	DA_2	V_{2N}	-	-													
	Lower	V	W	A_3	DA_3	V_{3N}	A_N	DA_N													
P11	Upper	A	A	DA_1	V_{1N}	A	DA				-				ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	V	DA_2	V_{2N}	-	-				Wh										
	Lower	Wh	Wh	DA_3	V_{3N}	A_N	DA_N				Exported active energy										
P12	Upper	A	A	A	DA	W	A	DA			-				ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	W	V	V	V	-	-			Wh										
	Lower	Wh	Wh	Wh	Wh	Wh	A_N	DA_N			Exported active energy										
P13	Upper	A_1	V_{1N}	W_1	var_1	VA_1	$cosφ_1$	V	V	A	-	-	-	-	ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	A_2	V_{2N}	W_2	var_2	VA_2	$cosφ_2$	Hz	Hz	-	Wh	-	-	-							
	Lower	A_3	V_{3N}	W_3	var_3	VA_3	$cosφ_3$	Wh	varh	A_N	Exported active energy	Imported reactive energy (Lead)	Imported reactive energy (Lag)	Imported reactive energy (Lead)							
P00	Upper	Arbitrary	Arbitrary	Arbitrary	Arbitrary						-	-	-	-	ditto	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	Arbitrary	Arbitrary	Arbitrary	Arbitrary						Wh	-	-	-							
	Lower	Arbitrary	Arbitrary	Arbitrary	Arbitrary						Exported active energy	Imported reactive energy (Lead)	Imported reactive energy (Lag)	Imported reactive energy (Lead)							

Note 1: When an additional screen is added, a screen number is added.

Note 2: In the table, Wh indicates Imported active energy , and varh indicates Imported reactive energy (lag).

6. Other

6.1 Display Pattern Contents

[For others except 3-phase 4-wire] Setting

Display pattern		Screen set by display pattern					Additional display (Set in the set-up menus 3, 7, 8)									
		No.1	No.2	No.3	No.4	No.5	No.6 Exported active energy	No.7 Imported reactive energy (Lead)	No.8 Exported reactive energy (Lag)	No.9 Exported reactive energy (Lead)	No.10 Harmonic current	No.11 Harmonic voltage	No.12 Digital input (DI1 to DI3)	No.13 Operation time 1	No.14 Operation time 2	No.15 CO_2 emission
P01	Upper	A	A	A							Degree	Degree	d.in	—	—	—
	Middle	W	W	cosφ							Ratio	Ratio	1 2 3	hour1	hour2	CO_2
	Lower	V	cosφ	V							RMS value	RMS value	status	Operation time	Operation time	Emission
P02	Upper	A	A	A			—				ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	W	cosφ			Exported active energy									
	Lower	Wh	Wh	Wh			Exported active energy									
P03	Upper	A	A	A	A						ditto	ditto	ditto	ditto	ditto	ditto
	Middle	cosφ	cosφ	cosφ	cosφ											
	Lower	V	W	var	Hz											
P04	Upper	A	A	A	A	A	—	—	—	—	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	W	var	cosφ	Hz	Exported active energy	—	—	—						
	Lower	Wh	Wh	Imported reactive energy (Lag)	Wh	Exported active energy	Exported active energy	Imported reactive energy (Lead)	Exported reactive energy (Lag)	Exported reactive energy (Lag)						
P05	Upper	cosφ	Hz								ditto	ditto	ditto	ditto	ditto	ditto
	Middle	W	W													
	Lower	var	var													
P06	Upper	A_1	V_{12}	A							ditto	ditto	ditto	ditto	ditto	ditto
	Middle	A_2	V_{23}	—												
	Lower	A_3	V_{31}	V												
P07	Upper	A	A_1	V_{12}							ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	A_2	V_{23}												
	Lower	W	A_3	V_{31}												
P08	Upper	A	A	A_1	V_{12}		—				ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	W	A_2	V_{23}		Exported active energy									
	Lower	Wh	Wh	A_3	V_{31}		Exported active energy									
P09	Upper	A	A_1	DA_1	V_{12}						ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	A_2	DA_2	V_{23}											
	Lower	V	A_3	DA_3	V_{31}											
P10	Upper	A	A	A_1	DA_1	V_{12}					ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	DA	A_2	DA_2	V_{23}										
	Lower	V	W	A_3	DA_3	V_{31}										
P11	Upper	A	A	DA_1	V_{12}		—				ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	V	DA_2	V_{23}		Exported active energy									
	Lower	Wh	Wh	DA_3	V_{31}		Exported active energy									
P12	Upper	A	A	A	DA	W	—				ditto	ditto	ditto	ditto	ditto	ditto
	Middle	DA	W	V	V	V	Exported active energy									
	Lower	Wh	Wh	Wh	Wh	Wh	Exported active energy									
P13	Upper	A_1	V_{12}	W	V	V	—	—	—	—	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	A_2	V_{23}	var	Hz	Hz	Exported active energy	—	—	—						
	Lower	A_3	V_{31}	cosφ	Wh	Imported reactive energy (Lead)	Exported active energy	Imported reactive energy (Lead)	Exported reactive energy (Lag)	Exported reactive energy (Lag)						
P14	Upper	A	A	A	A_2 fixed	A_2 fixed					ditto	ditto	ditto	ditto	ditto	ditto
	Middle	W	W	cosφ	W	cosφ										
	Lower	V	cosφ	V	V_{31} fixed	V_{31} fixed										
P15	Upper	A	A	A	A_2 fixed		—				ditto	ditto	ditto	ditto	ditto	ditto
	Middle	V	W	cosφ	V_{31} fixed		Exported active energy									
	Lower	Wh	Wh	Wh	Wh		Exported active energy									
P00	Upper	Arbitrary	Arbitrary	Arbitrary	Arbitrary		—	—	—	—	ditto	ditto	ditto	ditto	ditto	ditto
	Middle	Arbitrary	Arbitrary	Arbitrary	Arbitrary		Exported active energy	—	—	—						
	Lower	Arbitrary	Arbitrary	Arbitrary	Arbitrary		Exported active energy	Imported reactive energy (Lead)	Exported reactive energy (Lag)	Exported reactive energy (Lag)						

Note 1: When an additional screen is added, a screen number is added.

Note 2: When phase 2-wire, only phase1 (A_1, DA_1) is displayed for current, and only phase12 (V_{12}) is displayed for voltage. Other phases are not displayed even when they are set in the display pattern.

Note 3: The phases displayed in the display patterns of the above table are displayed on the screen according to the phase wire system setting shown in the table below.

Phase display in the table above \ phase wire		1P2W	1P3W(1N2)	1P3W(1N3)	3P3W (3CT, 2CT)
Current	1	Phase not displayed	1	1	1
	2	Measurement not displayed	N	N	2
	3	Measurement not displayed	2	3	3
Voltage	12	Phase not displayed	1N	1N	12
	23	Measurement not displayed	N2	N3	23
	31	Measurement not displayed	12	31	31

6. Other

6.2 Maximum Scale Value

[For 3-phase 4-wire]

Settable primary voltage, primary current, and standard maximum scale value are shown in the tables below.

●Maximum scale value of each item

Measurement element			Maximum scale value	
Voltage	In the case of direct voltage setting		Phase voltage	Line voltage
		(Phase voltage / Line voltage) 63.5V/110V	100V	150V
		100V/173V 110V/190V	150V	300V
		220V/380V 240V/415V 254V/440V	300V	600V
		277V/480V	400V	640V
	In the case of VT connected to secondary side		Primary voltage × $\frac{150}{110}$ *2	Primary voltage × $\sqrt{3}$ × $\frac{150}{110}$ *2
Current			Primary current value	
Active power			VT ratio × CT ratio × specific power (100%) kW *1	
Reactive power			VT ratio × CT ratio × specific power (100%) kvar *1	
Apparent power			VT ratio × CT ratio × specific power (100%) VA *1	
Power factor			LEAD0.5 to 1 to LAG0.5	
Frequency			45 to 55Hz (at 50Hz) 55 to 65Hz (at 60Hz)	

●Specific power value for scale calculation

Phase line type	Rated voltage (Phase voltage)	Specific power value (100%)	Specific reactive power (100%)
At direct input	63.5V direct	1.0kW	1.0kvar
	100V direct 110V direct	2.0kW	2.0kvar
	220V direct 240V direct 254V direct	4.0kW	4.0kvar
	277V direct	5.0kW	5.0kvar
In the case with VT (secondary voltage set value)	63.5V	1.0kW	1.0kvar
	100V 110V 115V 120V	2.0kW	2.0kvar

*1 At direct voltage setting, VT ratio = 1. The specific power is according to the table on the right.
*2 For convenience of scale, this is rounded off to the nearest whole number.

■Maximum scale value for active power / reactive power (representative example)

Unit: Active power: W, Reactive power: var

Phase wire system	Three-phase 4-wire	
Primary current value(A) \ Primary voltage value	Direct 110V/190V	Direct 254V/440V 240V/415V
10.0	4k	8k
15.0	6k	12k
20.0	8k	16k
25.0	10k	20k
30.0	12k	24k
40.0	16k	32k
50.0	20k	40k
60.0	24k	48k
75.0	30k	60k
80.0	32k	64k
100.0	40k	80k
120.0	48k	96k
150.0	60k	120k
200.0	80k	160k
250.0	100k	200k
300.0	120k	240k

Phase wire system	Three-phase 4-wire	
Primary current value(A) \ Primary voltage value	Direct 110V/190V	Direct 254V/440V 240V/415V
400	160k	320k
500	200k	400k
600	240k	480k
750	300k	600k
800	320k	640k
1000	400k	800k
1200	480k	960k
1500	600k	1200k
2000	800k	1600k
2500	1000k	2000k
3000	1200k	2400k
4000	1600k	3000k
5000	2000k	4000k

6. Other

6.2 Maximum Scale Value

[For others except 3-phase 4-wire]

The following tables show the primary voltage, primary current, and standard maximum scale values that can be set.

●Standard maximum scale value of each element

▪Voltage: 150V (110V direct), 300V (220V direct), 150V×VT ratio. For 1-phase 3-wire, between 1N, 2N, 3N: 150V, between 12, 13: 300V

▪Current: 5A, 5A×CT ratio

▪Active power

1-Phase 2-Wire: 0.5kW (kvar)×VT ratio×CT ratio (220V direct: VT ratio = 2)

1-Phase 3-Wire: 1kW (kvar)×CT ratio

3-Phase 3-Wire: 1kW (kvar)×VT ratio×CT ratio (220V direct: VT ratio = 2)

▪Power factor: Bar graph display: LEAD -0.5 to 1 to LAG 0.5, Digital display: LEAD -0 to 1 to LAG 0

▪Frequency: 45 to 55Hz (at 50Hz), 55 to 65Hz (at 60Hz)

■Primary voltage ■Primary current ■Maximum scale for active power / reactive power

▪Unit: Active Power: W, Reactive power: var

▪1-phase 2-wire
▪3-phase 3-wire

Primary voltage (V)	Maximum scale (V)
110 direct	150
220 direct	300
220	300
440	600
690	960
1.1k	1.5k
2.2k	3k
3.3k	4.5k
6.6k	9k
11k	15k
13.2k	18k
13.8k	18k
15k	20k
16.5k	22k
22k	30k
24k	32k
33k	45k
66k	90k
77k	100k
110k	150k
132k	180k
154k	220k
187k	250k
220k	300k
275k	400k
380k	500k
500k	720k
550k	750k
SP	

▪1-phase 3-wire

Between phases	Maximum scale (V)
1N 2N 3N	150
12 13	300

Primary current (A)
1
5
6
7.5
8
10
12
15
20
25
30
40
50
60
75
80
100
120
150
200
250
300
400
500
600
750
800
1000
1200
1500
1600
2000
2500
3000
4000
5000
6000
7500
8000
10k
12k
20k
25k
30k
SP

Note 1: "SP" indicates a special voltage and special current.

Phase wire method	1-phase 3-wire	1-phase 2-wire				3-phase 3-wire								
Primary voltage (V) / Primary current (A)	220	220	440	3300	6600	220	440	3300	6600	11k	22k	33k	66k	77k
10	2000	2000	4000	30k	60k	4000	8000	60k	120k	200k	400k	600k	1200k	1500k
15	3000	3000	6000	45k	90k	6000	12k	90k	180k	300k	600k	900k	1800k	2200k
20	4000	4000	8000	60k	120k	8000	16k	120k	240k	400k	800k	1200k	2400k	3000k
25	5000	5000	10k	75k	150k	10k	20k	150k	300k	500k	1000k	1500k	3000k	3600k
30	6000	6000	12k	90k	180k	12k	24k	180k	360k	600k	1200k	1800k	3600k	4000k
40	8000	8000	16k	120k	240k	16k	32k	240k	480k	800k	1600k	2400k	4800k	6000k
50	10k	10k	20k	150k	300k	20k	40k	300k	600k	1000k	2000k	3000k	6000k	7200k
60	12k	12k	24k	180k	360k	24k	48k	360k	720k	1200k	2400k	3600k	7200k	8000k
75	15k	15k	30k	220k	450k	30k	60k	450k	900k	1500k	3000k	4500k	9M	10M
80	16k	16k	32k	240k	480k	32k	64k	480k	960k	1600k	3200k	4800k	9.6M	10M
100	20k	20k	40k	300k	600k	40k	80k	600k	1200k	2000k	4000k	6000k	12M	15M
120	24k	24k	48k	360k	720k	48k	96k	720k	1500k	2400k	4800k	7200k	15M	16M
150	30k	30k	60k	450k	900k	60k	120k	900k	1800k	3000k	6000k	9M	18M	22M
200	40k	40k	80k	600k	1200k	80k	160k	1200k	2400k	4000k	8000k	12M	24M	30M
250	50k	50k	100k	750k	1500k	100k	200k	1500k	3000k	5000k	10M	15M	30M	36M
300	60k	60k	120k	900k	1800k	120k	240k	1800k	3600k	6000k	12M	18M	36M	40M
400	80k	80k	160k	1200k	2400k	160k	320k	2400k	4800k	8000k	16M	24M	48M	60M
500	100k	100k	200k	1500k	3000k	200k	400k	3000k	6000k	10M	20M	30M	60M	72M
600	120k	120k	240k	1800k	3600k	240k	480k	3600k	7200k	12M	24M	36M	72M	80M
750	150k	150k	300k	2200k	4500k	300k	600k	4500k	9M	15M	30M	45M	90M	100M
800	160k	160k	320k	2400k	4800k	320k	640k	4800k	9.6M	16M	32M	48M	96M	100M
1000	200k	200k	400k	3000k	6000k	400k	800k	6000k	12M	20M	40M	60M	120M	150M
1200	240k	240k	480k	3600k	7200k	480k	960k	7200k	15M	24M	48M	72M	150M	160M
1500	300k	300k	600k	4500k	9M	600k	1200k	9M	18M	30M	60M	90M	180M	220M
2000	400k	400k	800k	6000k	12M	800k	1600k	12M	24M	40M	80M	120M	240M	300M
2500	500k	500k	1000k	7500k	15M	1000k	2000k	15M	30M	50M	100M	150M	300M	360M
3000	600k	600k	1200k	9M	18M	1200k	2400k	18M	36M	60M	120M	180M	360M	400M
4000	800k	800k	1600k	12M	24M	1600k	3200k	24M	48M	80M	160M	240M	480M	600M
5000	1000k	1000k	2000k	15M	30M	2000k	4000k	30M	60M	100M	200M	300M	600M	720M

▪Inquire about the maximum scale value for primary voltages and primary currents not shown in this table.

6. Other

6.3 Possible Setting Range for Maximum Scale

The maximum scale for current can be selected from about 40 to 120% of the rating, and maximum scale for active power and reactive power can be selected from about 20 to 120% of the rating, for scale conditions active the values in the following tables are applied. This is the same as with corresponding measured values for maximum scale of analog output.

■Current maximum scale value

Possible setting range: -10 STEP to +3 STEP of the rating

Example: When the rating is 100A, the value is from 45A to 160A.

Current maximum scale value (1/3)

STEP	A unit	kA unit
1	1A	
2	1.2A	
3	1.5A	
4	1.6A	
5	2A	
6	2.2A	
7	2.4A	
8	2.5A	
9	3A	
10	3.2A	
11	3.6A	
12	4A	
13	4.5A	
14	4.8A	
15	5A	
16	6A	
17	6.4A	
18	7.2A	
19	7.5A	
20	8A	
21	9A	
22	9.6A	
23	10A	
24	12A	
25	15A	
26	16A	
27	18A	
28	20A	
29	22A	
30	24A	
31	25A	
32	30A	
33	32A	
34	36A	
35	40A	
36	45A	
37	48A	
38	50A	
39	60A	
40	64A	
41	72A	
42	75A	
43	80A	
44	90A	
45	96A	
46	100A	
47	120A	
48	150A	
49	160A	
50	180A	

Current maximum scale value (2/3)

STEP	A unit	kA unit
51	200A	
52	220A	
53	240A	
54	250A	
55	300A	
56	320A	
57	360A	
58	400A	
59	450A	
60	480A	
61	500A	
62	600A	
63	640A	
64	720A	
65	750A	
66	800A	
67	900A	
68	960A	
69	1000A	1kA
70	1200A	1.2kA
71	1500A	1.5kA
72	1600A	1.6kA
73	1800A	1.8kA
74	2000A	2kA
75	2200A	2.2kA
76	2400A	2.4kA
77	2500A	2.5kA
78	3000A	3kA
79	3200A	3.2kA
80	3600A	3.6kA
81	4000A	4kA
82	4500A	4.5kA
83	4800A	4.8kA
84	5000A	5kA
85	6000A	6kA
86	6400A	6.4kA
87	7200A	7.2kA
88	7500A	7.5kA
89	8000A	8kA
90		9kA
91		9.6kA
92		10kA
93		12kA
94		15kA
95		16kA
96		18kA
97		20kA
98		22kA
99		24kA
100		25kA

Current maximum scale value (3/3)

STEP	A unit	kA unit
101		30kA
102		32kA
103		36kA
104		40kA

6.3 Possible Setting Range for Maximum Scale

■Maximum scale value for active power / reactive power

Possible setting range:
-18 STEP to +3 STEP of the rating

1-Phase 2-Wire: 0.5kW (kvar)×VT ratio×CT ratio (220V direct: VT ratio = 2)
1-Phase 3-Wire: 1kW (kvar)×CT ratio
3-Phase 3-Wire: 1kW (kvar)×VT ratio×CT ratio (220V direct: VT ratio = 2)
(When outside of the table, the value is set to the nearest value from the table.)
Example: For 6600/110V 100/5A 3P3W
W=1kW×60×20=1200kW → The rated power is 1200kW (or 1.2MW).
3-Phase 4-Wire: Specific power kW (kvar)×VT ratio×CT ratio (Direct: VT ratio = 1)
(For details on specific power, refer to page 60.)

Maximum scale value of active power and reactive power (1/4)

STEP	W unit var unit	kW unit kvar unit
1	32W(var)	
2	36W(var)	
3	40W(var)	
4	45W(var)	
5	48W(var)	
6	50W(var)	
7	60W(var)	
8	64W(var)	
9	72W(var)	
10	75W(var)	
11	80W(var)	
12	90W(var)	
13	96W(var)	
14	100W(var)	
15	120W(var)	
16	150W(var)	
17	160W(var)	
18	180W(var)	
19	200W(var)	
20	220W(var)	
21	240W(var)	
22	250W(var)	
23	300W(var)	
24	320W(var)	
25	360W(var)	
26	400W(var)	
27	450W(var)	
28	480W(var)	
29	500W(var)	
30	600W(var)	
31	640W(var)	
32	720W(var)	
33	750W(var)	
34	800W(var)	
35	900W(var)	
36	960W(var)	
37	1000W(var)	1kW(var)
38	1200W(var)	1.2kW(var)
39	1500W(var)	1.5kW(var)
40	1600W(var)	1.6kW(var)
41	1800W(var)	1.8kW(var)
42	2000W(var)	2kW(var)
43	2200W(var)	2.2kW(var)
44	2400W(var)	2.4kW(var)
45	2500W(var)	2.5kW(var)
46	3000W(var)	3kW(var)
47	3200W(var)	3.2kW(var)
48	3600W(var)	3.6kW(var)
49	4000W(var)	4kW(var)
50	4500W(var)	4.5kW(var)

Maximum scale value of active power and reactive power (2/4)

STEP	W unit var unit	kW unit kvar unit
51	4800W(var)	4.8kW(var)
52	5000W(var)	5kW(var)
53	6000W(var)	6kW(var)
54	6400W(var)	6.4kW(var)
55	7200W(var)	7.2kW(var)
56	7500W(var)	7.5kW(var)
57	8000W(var)	8kW(var)
58		9kW(var)
59		9.6kW(var)
60		10kW(var)
61		12kW(var)
62		15kW(var)
63		16kW(var)
64		18kW(var)
65		20kW(var)
66		22kW(var)
67		24kW(var)
68		25kW(var)
69		30kW(var)
70		32kW(var)
71		36kW(var)
72		40kW(var)
73		45kW(var)
74		48kW(var)
75		50kW(var)
76		60kW(var)
77		64kW(var)
78		72kW(var)
79		75kW(var)
80		80kW(var)
81		90kW(var)
82		96kW(var)
83		100kW(var)
84		120kW(var)
85		150kW(var)
86		160kW(var)
87		180kW(var)
88		200kW(var)
89		220kW(var)
90		240kW(var)
91		250kW(var)
92		300kW(var)
93		320kW(var)
94		360kW(var)
95		400kW(var)
96		450kW(var)
97		480kW(var)
98		500kW(var)
99		600kW(var)
100		640kW(var)

Maximum scale value of active power and reactive power (3/4)

STEP	kW unit kvar unit	MW unit Mvar unit
101	720kW(var)	
102	750kW(var)	
103	800kW(var)	
104	900kW(var)	
105	960kW(var)	
106	1000kW(var)	1MW(var)
107	1200kW(var)	1.2MW(var)
108	1500kW(var)	1.5MW(var)
109	1600kW(var)	1.6MW(var)
110	1800kW(var)	1.8MW(var)
111	2000kW(var)	2MW(var)
112	2200kW(var)	2.2MW(var)
113	2400kW(var)	2.4MW(var)
114	2500kW(var)	2.5MW(var)
115	3000kW(var)	3MW(var)
116	3200kW(var)	3.2MW(var)
117	3600kW(var)	3.6MW(var)
118	4000kW(var)	4MW(var)
119	4500kW(var)	4.5MW(var)
120	4800kW(var)	4.8MW(var)
121	5000kW(var)	5MW(var)
122	6000kW(var)	6MW(var)
123	6400kW(var)	6.4MW(var)
124	7200kW(var)	7.2MW(var)
125	7500kW(var)	7.5MW(var)
126	8000kW(var)	8MW(var)
127		9MW(var)
128		9.6MW(var)
129		10MW(var)
130		12MW(var)
131		15MW(var)
132		16MW(var)
133		18MW(var)
134		20MW(var)
135		22MW(var)
136		24MW(var)
137		25MW(var)
138		30MW(var)
139		32MW(var)
140		36MW(var)
141		40MW(var)
142		45MW(var)
143		48MW(var)
144		50MW(var)
145		60MW(var)
146		64MW(var)
147		72MW(var)
148		75MW(var)
149		80MW(var)
150		90MW(var)

Maximum scale value of active power and reactive power (4/4)

STEP	MW unit Mvar unit
151	96MW(var)
152	100MW(var)
153	120MW(var)
154	150MW(var)
155	160MW(var)
156	180MW(var)
157	200MW(var)
158	220MW(var)
159	240MW(var)
160	250MW(var)
161	300MW(var)
162	320MW(var)
163	360MW(var)
164	400MW(var)
165	450MW(var)
166	480MW(var)
167	500MW(var)
168	600MW(var)
169	640MW(var)
170	720MW(var)
171	750MW(var)
172	800MW(var)
173	900MW(var)
174	960MW(var)
175	1000MW(var)
176	1200MW(var)
177	1500MW(var)
178	1600MW(var)
179	1800MW(var)
180	2000MW(var)
181	2200MW(var)
182	2400MW(var)
183	2500MW(var)
184	3000MW(var)
185	3200MW(var)
186	3600MW(var)
187	4000MW(var)
188	4500MW(var)
189	4800MW(var)
190	5000MW(var)
191	6000MW(var)
192	6400MW(var)
193	7200MW(var)
194	7500MW(var)
195	8000MW(var)

6.4 Measurement Items and Correspondence between Display and Output

The table below shows the measurement items and correspondence between display and output.

[For 3-phase 4-wire] ●: Data can be displayed or output -: Data cannot be displayed or output

Measurement item				Display/communication (CC-Link, Modbus)			Analog output	Pulse
				Present value	Max. value	Min. value	Present value	Present value
Current			phase 1	●	●	●	●	-
			phase 2	●	●	●	●	-
			phase 3	●	●	●	●	-
			phase N	●	●	●	●	-
			Average	●	●	●	●	-
Current demand			phase 1	●	●	●	●	-
			phase 2	●	●	●	●	-
			phase 3	●	●	●	●	-
			phase N	●	●	●	●	-
			Average	●	●	●	●	-
Voltage			phase 1N	●	●	●	●	-
			phase 2N	●	●	●	●	-
			phase 3N	●	●	●	●	-
			Phase voltage average	●	●	●	●	-
			phase 12	●	●	●	●	-
			phase 23	●	●	●	●	-
			phase 31	●	●	●	●	-
			Average line voltage	●	●	●	●	-
Active power			phase 1	●	●	●	●	-
			phase 2	●	●	●	●	-
			phase 3	●	●	●	●	-
			Total (Σ)	●	●	●	●	-
Active power demand			phase 1	●	●	●	●	-
			phase 2	●	●	●	●	-
			phase 3	●	●	●	●	-
			Total (Σ)	●	●	●	●	-
Reactive power			phase 1	●	●	●	●	-
			phase 2	●	●	●	●	-
			phase 3	●	●	●	●	-
			Total (Σ)	●	●	●	●	-
Apparent power			phase 1	●	●	●	●	-
			phase 2	●	●	●	●	-
			phase 3	●	●	●	●	-
			Total (Σ)	●	●	●	●	-
Power factor			phase 1	●	●	●	●	-
			phase 2	●	●	●	●	-
			phase 3	●	●	●	●	-
			Total (Σ)	●	●	●	●	-
Frequency				●	●	●	●	-
Harmonic current	RMS	Total	phase 1	●	● (Note 2)	-	●	-
			phase 2	●		-	●	-
			phase 3	●		-	●	-
			phase N	●	●	-	●	-
		1st	phase 1	●	● (Note 2)	-	-	-
			phase 2	●		-	-	-
			phase 3	●		-	-	-
			phase N	●	●	-	-	-
		3rd-13th (Note 1)	phase 1	●	● (Note 2)	-	-	-
			phase 2	●		-	-	-
			phase 3	●		-	-	-
			phase N	●	●	-	-	-
	Distortion ratio	Total	phase 1	●	-	-	-	-
			phase 2	●	-	-	-	-
			phase 3	●	-	-	-	-
		3rd-13th (Note 1)	phase 1	●	-	-	-	-
			phase 2	●	-	-	-	-
			phase 3	●	-	-	-	-
Harmonic voltage	RMS	Total	phase 1N	●	-	-	●	-
			phase 2N	●	-	-	●	-
			phase 3N	●	-	-	●	
		1st	phase 1N	●	● (Note 2)	-	-	-
			phase 2N	●		-	-	-
			phase 3N	●		-	-	-
		3rd-13th (Note 1)	phase 1N	●	-	-	-	-
			phase 2N	●	-	-	-	-
			phase 3N	●	-	-	-	-
	Distortion ratio	Total	phase 1N	●	● (Note 2)	-	-	-
			phase 2N	●		-	-	-
			phase 3N	●		-	-	-
		3rd-13th (Note 1)	phase 1N	●	● (Note 2)	-	-	-
			phase 2N	●		-	-	-
			phase 3N	●		-	-	-
Active energy			Imported	●	-	-	-	●
			Exported	●	-	-	-	●
Active energy (enlarged)			Imported	●	-	-	-	-
			Exported	●	-	-	-	-
Reactive electric energy			Imported lag	●	-	-	-	●
			Imported lead	●	-	-	-	●
			Exported lag	●	-	-	-	●
			Exported lead	●	-	-	-	●
Reactive electric energy (enlarged)			Imported lag	●	-	-	-	-
			Imported lead	●	-	-	-	-
			Exported lag	●	-	-	-	-
			Exported lead	●	-	-	-	-
Digital input status			DI1 to DI3	●	-	-	-	-
CO_2 emission				● (Display only)	-	-	-	-
Operation time 1				● (Display only)	-	-	-	-
Operation time 2				● (Display only)	-	-	-	-

Note 1: Harmonic 3rd to 13th are only odd degrees.

Note 2: The largest value among the maximum values of each phase is displayed/output.

6. Other

6.4 Measurement Items and Correspondence between Display and Output

[For others except for 3-phase 4-wire] ●: Data can be displayed or output -: Data cannot be displayed or output

Measurement item (Note 1)				Display / communication (CC-Link, ModBus)									Analog output			Pulse
				3P3W			1P3W			1P2W			3P3W	1P3W	1P2W	
				Present value	Max. value	Min. value	Present value	Max. value	Min. value	Present value	Max. value	Min. value	Present value	Present value	Present value	Present value
Current			phase 1	●	●	●	●	●	●	●	●	●	●	●	●	-
			phase 2	●	●	●	●	●	●	-	-	-	●	●	-	-
			phase 3	●	●	●	●	●	●	-	-	-	●	●	-	-
Demand current			phase 1	●	●	●	●	●	●	●	●	●	●	●	●	-
			phase 2	●	●	●	●	●	●	-	-	-	●	●	-	-
			phase 3	●	●	●	●	●	●	-	-	-	●	●	-	-
Voltage			phase 12	●	●	●	●	●	●	●	●	●	●	●	●	-
			phase 23	●	●	●	●	●	●	-	-	-	●	●	-	-
			phase 31	●	●	●	●	●	●	-	-	-	●	●	-	-
Active power			Total (Σ)	●	●	●	●	●	●	●	●	●	●	●	●	-
Active power demand			Total (Σ)	●	●	●	●	●	●	●	●	●	●	●	●	-
Reactive power			Total (Σ)	●	●	●	●	●	●	●	●	●	●	●	●	-
Power factor			Total (Σ)	●	●	●	●	●	●	●	●	●	●	●	●	-
Frequency				●	●	●	●	●	●	●	●	●	●	●	●	-
Harmonic current	RMS value	Total	phase 1	●	● (Note 3)	-	●	● (Note 3)	-	●	●	-	●	●	●	-
			phase 3	●		-	●		-	-	-	-	●	●	-	-
		1st	phase 1	●	● (Note 3)	-	●	● (Note 3)	-	●	●	-	-	-	-	-
			phase 3	●		-	●		-	-	-	-	-	-	-	-
		3rd-13th (Note 2)	phase 1	●	● (Note 3)	-	●	● (Note 3)	-	●	●	-	-	-	-	-
			phase 3	●		-	●		-	-	-	-	-	-	-	-
	Distortion ratio	Total	phase 1	●	-	-	●	-	-	●	-	-	-	-	-	-
			phase 3	●	-	-	●	-	-	-	-	-	-	-	-	-
		3rd-13th (Note 2)	phase 1	●	-	-	●	-	-	●	-	-	-	-	-	-
			phase 3	●	-	-	●	-	-	-	-	-	-	-	-	-
Harmonic voltage	RMS value	Total	phase 12	●	-	-	●	-	-	●	-	-	-	-	-	-
			phase 23	●	-	-	●	-	-	-	-	-	-	-	-	-
		1st	phase 12	●	● (Note 3)	-	●	● (Note 3)	-	●	●	-	-	-	-	-
			phase 23	●		-	●		-	-	-	-	-	-	-	-
		3rd-13th (Note 2)	phase 12	●	-	-	●	-	-	●	-	-	-	-	-	-
			phase 23	●	-	-	●	-	-	-	-	-	-	-	-	-
	Distortion ratio	Total	phase 12	●	● (Note 3)	-	●	● (Note 3)	-	●	●	-	●	●	●	-
			phase 23	●		-	●		-	-	-	-	●	●	-	-
		3rd-13th (Note 2)	phase 12	●	● (Note 3)	-	●	● (Note 3)	-	●	●	-	-	-	-	-
			phase 23	●		-	●		-	-	-	-	-	-	-	-
Active energy			Imported	●	-	-	●	-	-	●	-	-	-	-	-	●
			Exported	●	-	-	●	-	-	●	-	-	-	-	-	●
Active energy (enlarged)			Imported	●	-	-	●	-	-	●	-	-	-	-	-	-
			Exported	●	-	-	●	-	-	●	-	-	-	-	-	-
Reactive electric energy			Imported lag	●	-	-	●	-	-	●	-	-	-	-	-	●
			Imported lead	●	-	-	●	-	-	●	-	-	-	-	-	●
			Exported lag	●	-	-	●	-	-	●	-	-	-	-	-	●
			Exported lead	●	-	-	●	-	-	●	-	-	-	-	-	●
Reactive electric energy (enlarged)			Imported lag	●	-	-	●	-	-	●	-	-	-	-	-	-
			Imported lead	●	-	-	●	-	-	●	-	-	-	-	-	-
			Exported lag	●	-	-	●	-	-	●	-	-	-	-	-	-
			Exported lead	●	-	-	●	-	-	●	-	-	-	-	-	-
Digital input status		DI1 to DI3		●	-	-	●	-	-	●	-	-	-	-	-	-
CO_2 emission				● (Display only)	-	-	● (Display only)	-	-	● (Display only)	-	-	-	-	-	-
Operation time 1				● (Display only)	-	-	● (Display only)	-	-	● (Display only)	-	-	-	-	-	-
Operation time 2				● (Display only)	-	-	● (Display only)	-	-	● (Display only)	-	-	-	-	-	-

Note 1: When 1P3W is selected, read the phase for the measurement item according to the following table.

Phase wire method	1-phase	2-phase	3-phase	12-phase	23-phase	31-phase
1P3W(1N2)	phase 1	phase N	phase 2	phase 1N	phase 2N	phase 12
1P3W(1N3)	phase 1	phase N	phase 3	phase 2N	phase 3N	phase 13

Note 2: Harmonic 3rd to 13th are only odd degrees.
Note 3: The largest value among the maximum values of each phase is displayed/output.

6. Other

6.5 Measurement Characteristic

■Metering actions in other than operation mode

Status	Measurement	Display	Analog output	Alarm contact point	Pulse output
Several seconds just after turning on the auxiliary power supply (Backlight is lit, and LCD is not lit.)	No measurement	No display	Output over about 100% may be made until internal voltage becomes stable.	Opened	No output
Set-up mode, Set value confirmation mode	Same actions as in operation mode	No display of measured value	Same actions as in operation mode	Status before getting into set-up mode and set value confirmation mode is kept.	Same actions as in operation mode
During power failure	No measurement	No display	No output	Opened	No output

■Metering actions in input status

Measurement items	Actions	
Current (A) Current demand (DA)	For rated current of 5A (Standard) : 0A when the input current is less than 0.02A. For rated current of 1A (Special) : 0A when the input current is less than 0.008A.	When it is over the upper limit of the possible display range (9999), the upper limit of the possible display range (9999) is displayed.
Voltage (V)	0V when the input voltage (line voltage) is less than 11V. For 1P3W, 0V when the voltage between P1-P3 is less than 22V. For 3P4W, 0V when the phase voltage is less than 11V.	When it is over the upper limit of the possible display range (9999), the upper limit of the possible display range (9999) is displayed. For direct measurement, when it is over 655.35V, 655.35V is displayed.
Active power (W) Reactive power (var) Active power demand (DW) Apparent power (VA)	0W, 0var, and 0VA when the current and the voltage are 0A and 0V for all 3 phases.	When it is over the upper limit of the possible display range (9999), the upper limit of the possible display range (9999) is displayed.
Power factor (cosφ)	1.0 when the current and the voltage are 0A and 0V for all 3 phases.	
Frequency (Hz)	When the voltage of phase1 is 0V, ---- is displayed.	When the frequency is less than 44.5Hz or over 99.9Hz, ---- is displayed.
Voltage harmonics	For effective value measurement : When the voltage of one phase is 0V, ---- is displayed. : When the voltage is 0V, 0V is displayed. (Each phase) : When the frequency is less than 44.5Hz, ---- is displayed for all phases.	For content factor measurement : When the voltage of one phase is 0V, ---- is displayed. : When the voltage is 0V, 0% is displayed. (Each phase) : When the frequency is less than 44.5Hz, ---- is displayed for all phases.
Current harmonics	For effective value measurement : When the voltage of phase1 is 0V, 0A is displayed. : When the frequency is less than 44.5Hz, ---- is displayed for all phases.	For content factor measurement : When the voltage of phase1 is 0V, 0% is displayed. : When the frequency is less than 44.5Hz, ---- is displayed for all phases.

Note: Input current, input voltage, and input power mean input to mstrument. They are not to primary sides of VT, CT.

■Analog output action

Output range	Output limit setting is “ON”	-1% to 101% of span
	Output limit setting is “OFF”	-5% to 105% of span

6. Other

6.6 Troubleshooting

In the case of abnormal noise, odor, smoke, or heat generation from this instrument, turn it off at once. Check the followings before you ask for repair.

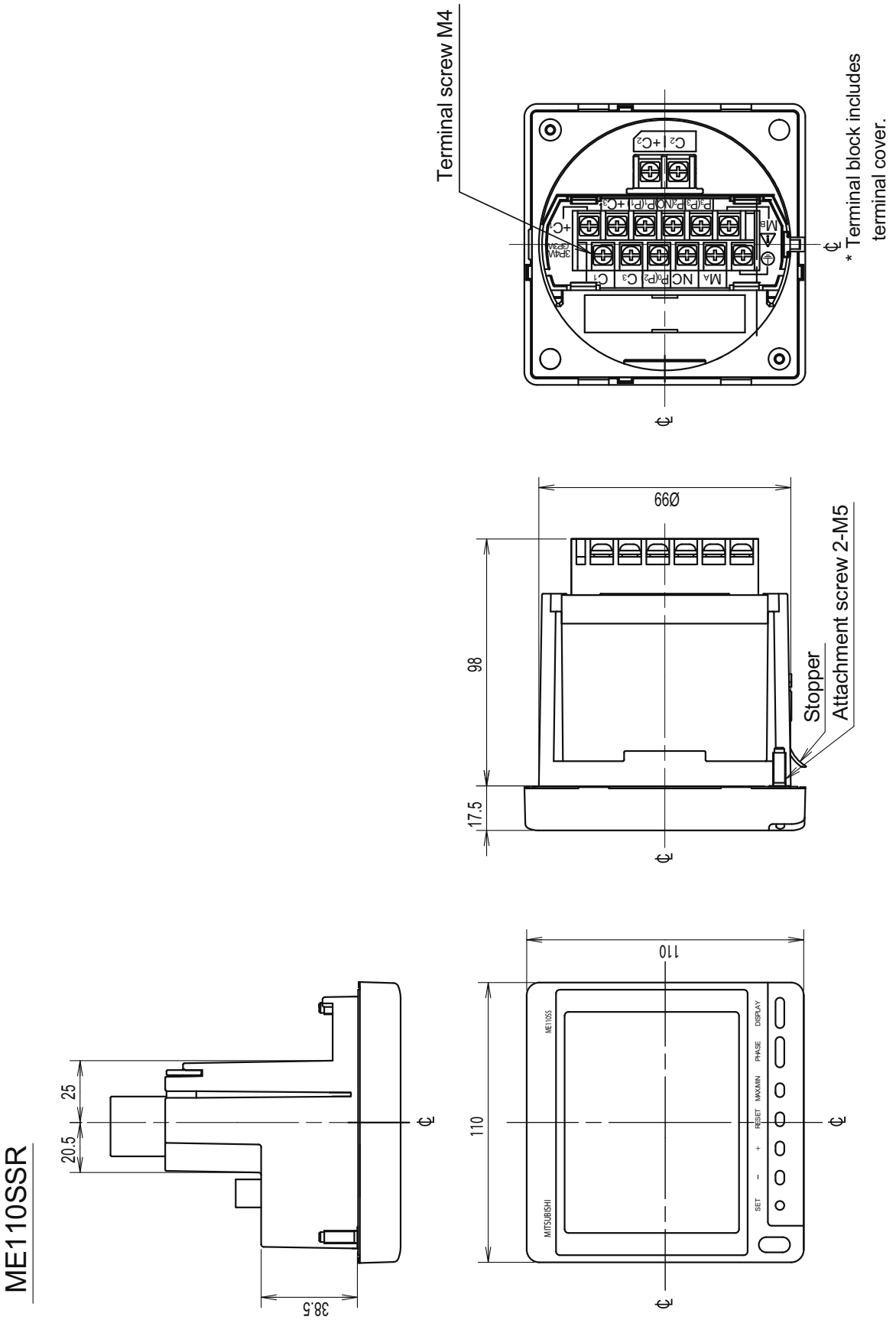
Condition		Possible cause	Solution
Display	The display is not lit.	Auxiliary power supply is not impressed on MA and MB terminals.	Impress auxiliary power supply.
	When the auxiliary power supply is impressed, display is not lit soon.	This is not an error. For about a few seconds after auxiliary power source is charged, initialization of internal circuit is carried out.	Use it as it is.
	The back light is not lit.	The back light may be set to auto off (Auto). (If it turns on after you press an operation key, it means the backlight is set to auto off.)	When the auto off is enabled, it automatically turns off in 5 minutes. Continue using it as it is or change the setting to HoLd (it stays on). (Refer to page 18)
	The display becomes black.	It may become black owing to static electricity.	It goes off after a while.
	“End” display remains.	The product is still in the set-up mode.	Press (SET) .
Measurement error	The current and voltage have large errors.	The settings for VT / direct voltage and CT primary current may be incorrect.	Please check the set values for VT / direct voltage and CT primary current.
	The current and voltage are correct, but the active power, reactive power, and power factor have large errors.	The wiring for VT/CT or for the measurement instrument may be incorrect.	Please check the wiring for VT/CT and for the measurement instrument.
	Measured values of cosφ is including large error.	If the input current is smaller than the rating, error becomes large. (about 5% or below of rated current)	This is not an error, or use it as it is, or if error is troublesome, change the CT according to the actual current to be used.
	The displayed active power is different from the active power that is calculated by multiplying the displayed current, voltage, and power factor.	If the AC of the current and voltage deteriorate due to harmonics, it will not be the same as the calculated value. (For AC without harmonics, the calculated value will match with the displayed value.)	Please continue using the instrument as it is.
	The total effective harmonics value from the harmonic current is very different from the current value.	The distortion factor (content factor) is way over 100%. (Such as measurement of the inverter secondary side output)	Please check the measured item.
	The current measured by another measurement instrument (such as a clamp meter) is different from the current measured by this instrument. (More than the tolerance)	If another measurement instrument uses the average method for measuring, the measurement instrument used will have a larger error when the AC deteriorates due to harmonics. (This measurement instrument uses the RMS value method.)	Please compare the currents using a measurement instrument that uses the RMS value method.
	Analog output has a large error.	If the wiring to receptor is long, the error may increase.	Perform the zero and span adjustment for analog output. (Refer to page 43.)
	Pulse output has a large error.	When the pulse unit is set to the minimum value and the pulse width is set to 0.500s or 1.000s, the pulse output cannot follow if the load is too large, which can result in a decrease in the pulse output number.	Review the pulse unit or pulse width setting (refer to pages 29).
	On the maximum/minimum value display screen, a present value that is outside of the maximum/ minimum range is displayed.	During the starting current delay time, the maximum value is not updated, so the present value that is over the maximum value may be displayed.	Please continue using the instrument as it is.
Operation	Cannot change the settings in the set-up mode.	If SET at the bottom of the screen is blinking, you are in the set value confirmation mode. Settings cannot be changed in this mode.	Please go to the set-up mode to change settings.
Other	Maximum value and minimum value changed.	These are cleared if the settings for the phase wire , VT/direct voltage, and CT primary current are changed.	Make a note of the values before changing the settings
	The values of the setting items that were not supposed to change have changed.	Some setting items return to the default values when settings for the phase wire method, VT/direct voltage, and CT primary current are changed.	Please refer to “Initializing Related Items by Changing Settings” (page 35) and reconfigure the setting items that returned to their default values.

7. Warranty

If you have any question or technical troubles in using the product, contact Mitsubishi Electric System & Service or your nearest branch of Mitsubishi Electric Corporation. (Refer to the end of this instruction manual for details.)

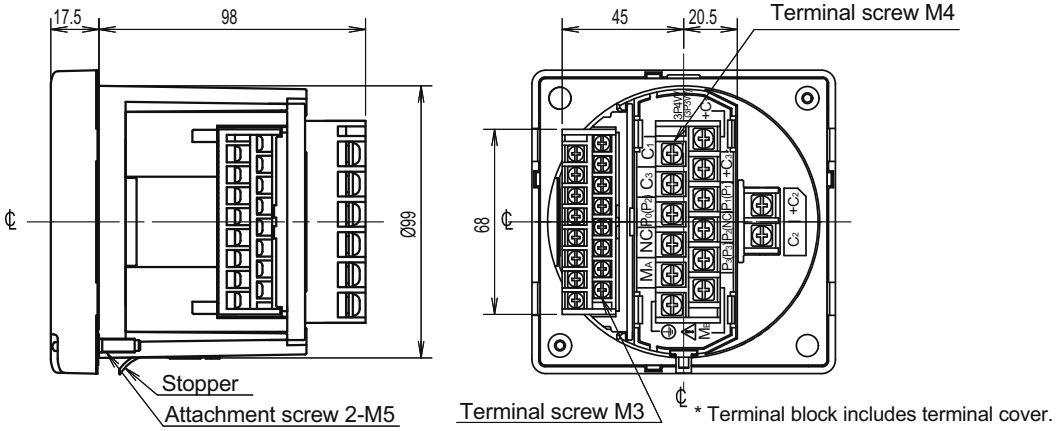
- The product is under free warranty for one year from purchase or 18 months after production, whichever comes first.
- The charge-free warranty applies to the cases where the product has a failure within the warranty period provided that the product has been used properly in the conditions, with the methods, and under the environment in accordance with the terms and precautions described in the catalogue, instruction manual, etc.
- In the following cases, the product is repaired on a chargeable basis even within the charge-free warranty period.
  - ① Failures due to improper storage, improper handling, carelessness, or negligence of the user
  - ② Failures due to improper installation
  - ③ Failures due to improper usage and unauthorized modifications
  - ④ Failures due to external factors such as fire and abnormal voltage, and force majeure such as an earthquake, wind, and flood.
  - ⑤ Failures due to matters unpredictable based on the level of science technology at the time of the shipment of the product.
- Regardless of the gratis warranty term,Mitsubishi shall not be liable for compensation of damages caused by any ca found not to be the responsibility of Mitubishi,loss in opportunity,lost profits incurred to the user by Failures of Mitsub products,special damages and secondary damages whether foreseeable or not,compensation for accidents,and compensation for damages to products other than Mitsubishi products,and other tasks.

Installation 1. External Dimensions

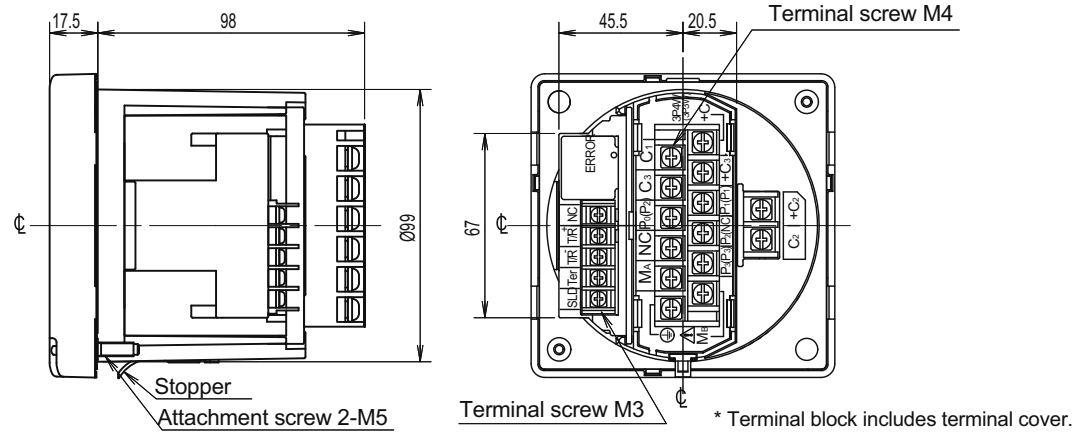


Installation 1. External Dimensions

ME110SSR-4AP, ME110SSR-4APH, ME110SSR-4A2P
ME110SSR-C, ME110SSR-CH



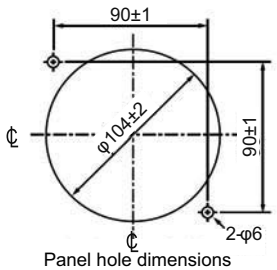
ME110SSR-MB



Installation 2. Mounting

1. Dimensions of hole panel

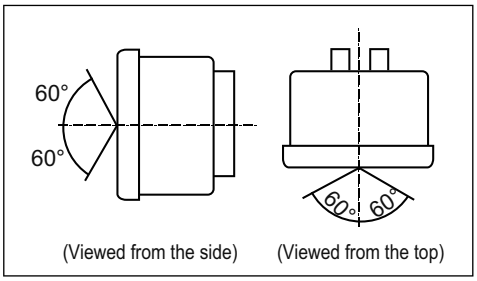
   The panel hole dimensions are as shown below. And it can be attached to a panel of thickness 1.6 - 4.5mm.



Panel hole dimensions
(Viewed from the front of panel)

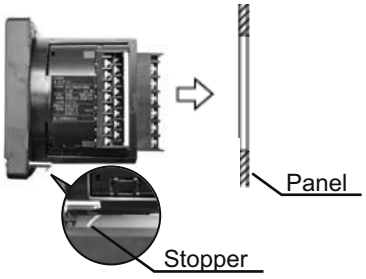
2. View angle

   The contrast of the display changes at view angles. Therefore, install it at the best position for viewing.



3. Attachment

   When inserting the main body into the panel hole, insert it slowly until the stopper at the bottom of the main body goes into the panel. Maneuver the body during insertion so that the terminal block does not contact the panel. After insertion, the stopper prevents the main body from dropping off even when releasing your hand from it.

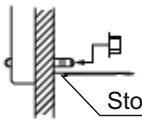


● Notes in assembling to the panel and detaching from it

In the meter with output functions, part of its terminal block protrudes from the cylindrical main body, to which pay attention in attaching and detaching.

Insert or take out the meter main body right diagonally.

Fasten the attachment nut (M5 nut with belleville spring) with torque about 1.47 - 1.96Nm.



Note

Protective sheet

A protective sheet is attached to the display for protection against scratch at attachment to panel. Please remove the protective sheet when starting operation. After removed the display may be lit owing to generation of static electricity, but it is not an error. It goes off by natural discharge after a while.

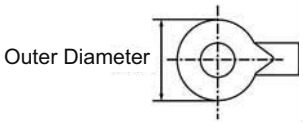
Attachment position

In the case to attach it to the end of the panel, check the wiring work space and decide the attachment position.

Installation 3. Wiring

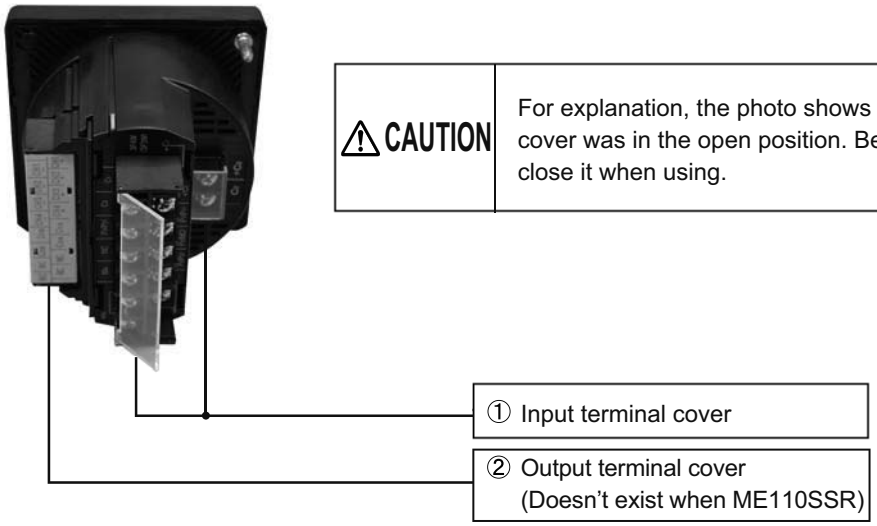
1. Crimping terminal

   The following table shows the compatible solderless terminals.



	Voltage current Input / Ground (⏚) Auxiliary power source	Output terminal
Screw spec	M4 screw	M3 screw
Solderless terminal	For M4 screw with an outer diameter of less than 8.5mm	For M3 screw with an outer diameter of less than 6.0mm
Fasten torque	0.98 to 1.47N▪m	0.5 to 0.6N▪m

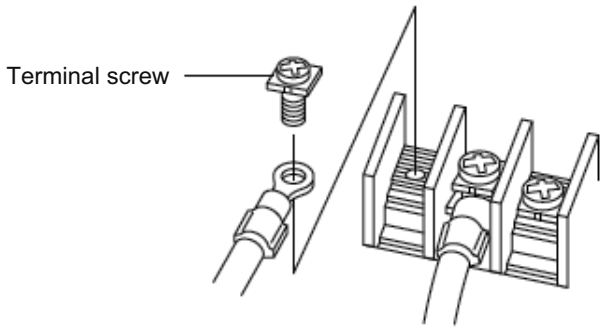
2. Open one side of the input terminal cover.



⚠CAUTION	For explanation, the photo shows the terminal cover was in the open position. Be sure to close it when using.

3. Wiring

   Be sure to securely tighten the terminal screws to the terminal block.



⚠CAUTION	Please do not connect three or more electric wires to one terminal. This can cause heat and fire due to imperfect contact.

4. Confirmation

   After wiring, make sure that there is no mistake in wiring.

5. Attaching terminal cover

   After confirming the wiring, attach the input terminal and output terminal covers until they make a click sound.

⚠ CAUTION

Do not work with hot-line jobs

Do not connect hot-line jobs. It may cause electric shock, burns, device burnout, or fire. It is recommended that a protection fuse be used for VT and the auxiliary power source.

Do not open the secondary side of the CT circuit

Connect the CT secondary side signal correctly to the terminal for CT connection. If the CT is not connected properly or if the secondary side of the CT is open, it may result in high voltage on the secondary side of the CT, the insulation of the secondary winding wire may be damaged, and burnout may be caused.

Do not short the secondary side of the VT circuit

Connect the VT secondary side signal correctly to the terminal for VT connection. If the VT is not connected properly or if the secondary side of the VT shorts, overcurrent may flow to the secondary side of the VT, which can burn out the secondary winding wire. If the secondary winding wire burns out, it can damage the insulation of the primary winding wire, resulting in a short between phases.

Make sure connections to the connection terminals are tight

Electrical wires must be properly tightened to the connection terminal. Otherwise, heat and measurement errors may be caused.

Remember the crossover between C1 and C3

When the L side of CT circuit is common wire in 3 phase 4-wire, it is necessary to shortcircuit “C1”,“C2” and “C3” terminal of this device. In the case of 3 phase 3-wire, “C1” and “C3” should be short circuited.

Do not use improper electrical wires

Make sure that the electrical wires have the proper rating for current and voltage. If inappropriate electrical wires are used, fire may be caused.

Do not pull the connection wires with force

If the terminal wiring is pulled with a strong force, the output portion may detach. (Tensile load: 39.2N or less)

Make sure the terminal cover is secure

Make sure the terminal cover is securely attached. Using the unit without the cover may cause electric shock.

Do not apply an abnormal voltage

If a pressure test is given to a high-pressure device, a ground must be used in order to avoid damaging this measurement instrument. If a high voltage of AC2000V is applied for over one minute to the measurement instrument, damage may occur.

Auxiliary power source

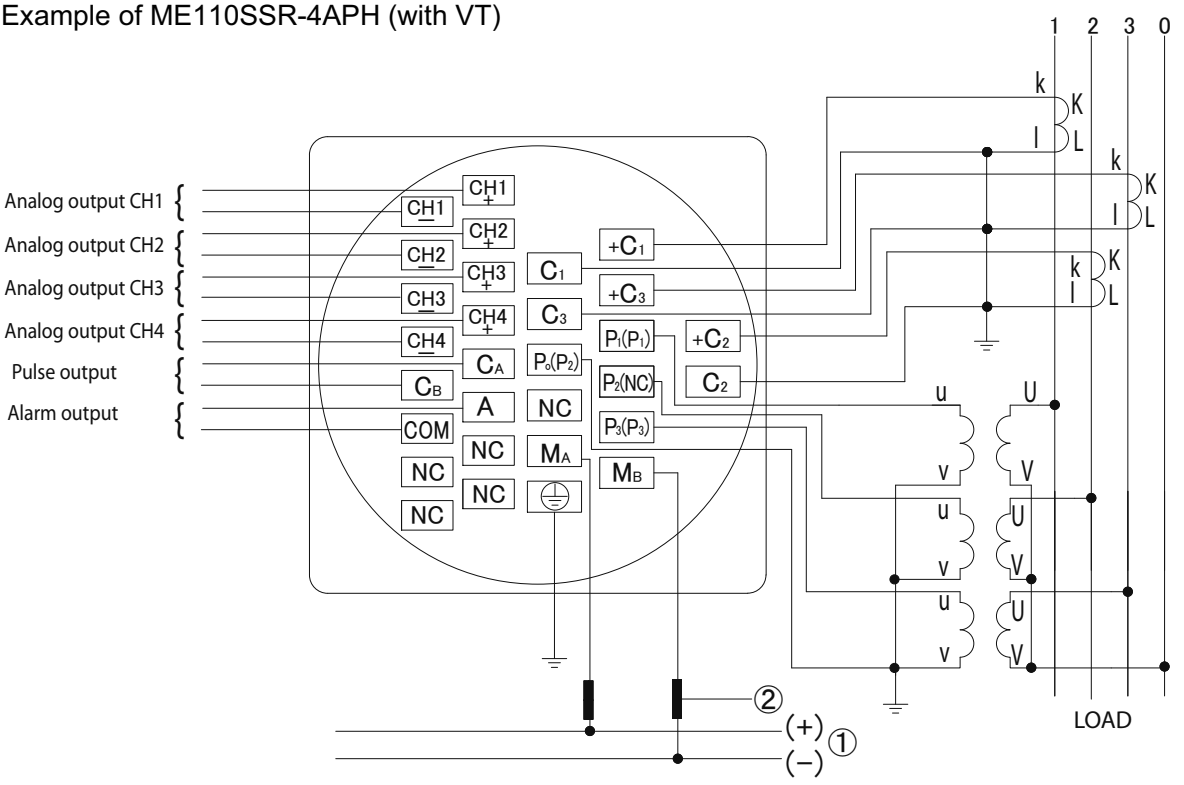
⚠ CAUTION

Use the proper voltage for the auxiliary power source

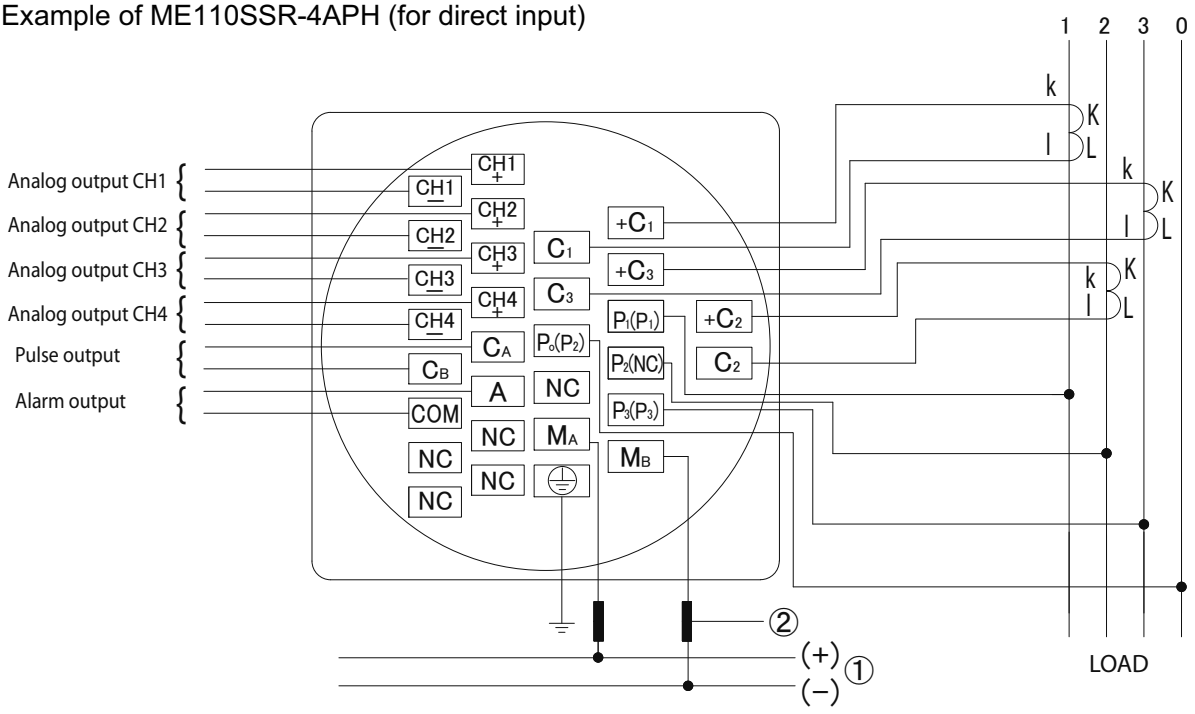
Use the proper voltage for the auxiliary power source terminal.
If an improper voltage is used, the instrument may be damaged or fire may be caused.

Installation 4. Wiring Diagram

Three phase 4-wire type :
Example of ME110SSR-4APH (with VT)



Three phase 4-wire type :
Example of ME110SSR-4APH (for direct input)

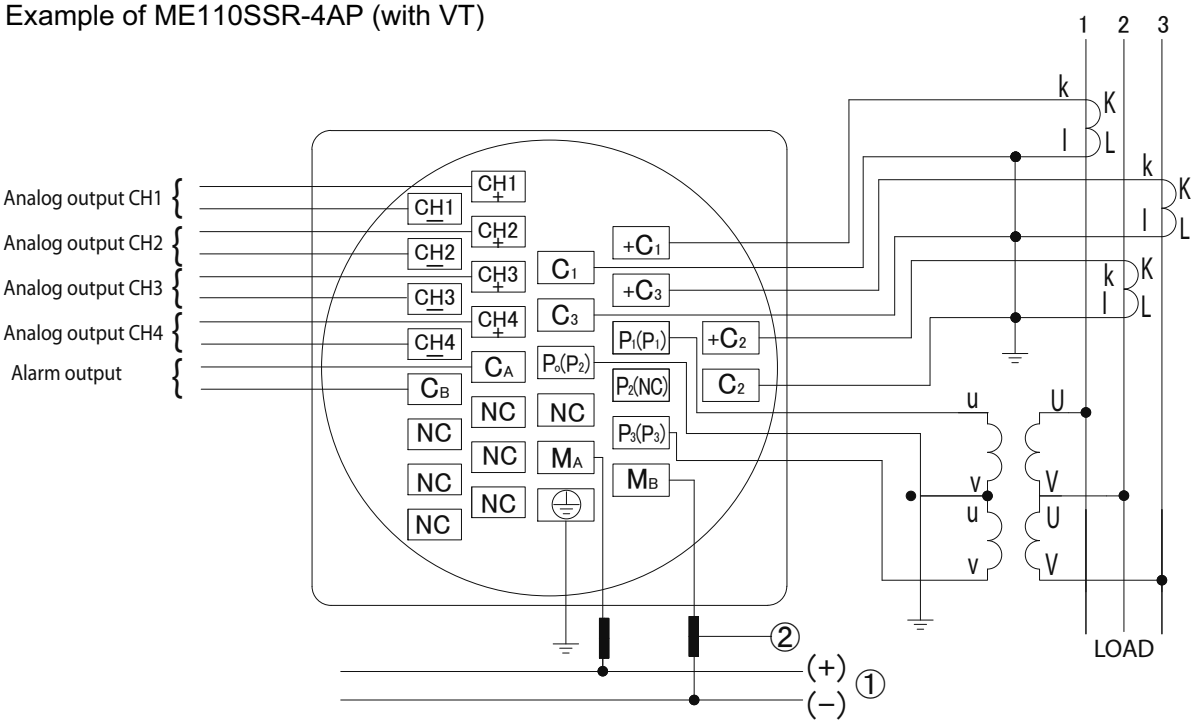


①Auxiliary power supply
AC100-240V or DC100V

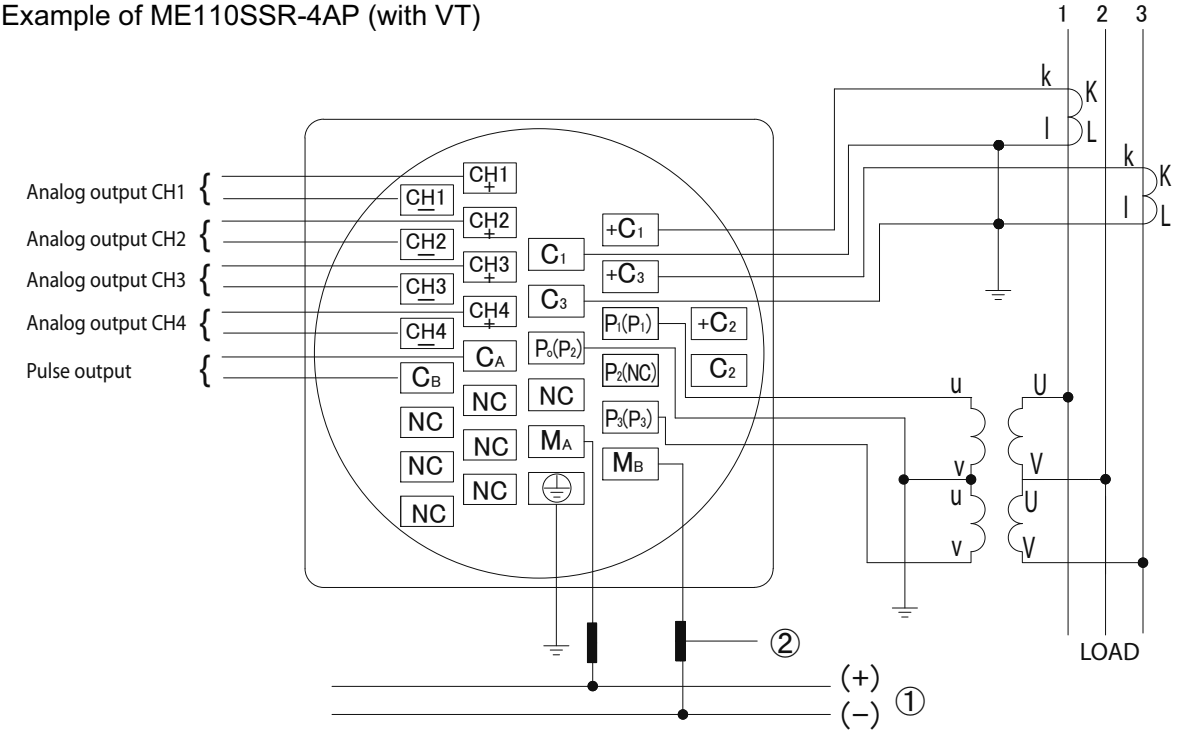
②Fuses gG type(IEC269) or M type rated between 0.5 and 5A
※1: For low voltage circuits,grounding of the secondary side of VT and CT is not necessary.
※2: Do not connect to NC terminal.
※3: The parentheses in the figure indicate that the terminals are for 3P3W, 1P3W, and 1P2W.

Installation 4. Wiring Diagram

Three phase 3-wire(3CT) type :
Example of ME110SSR-4AP (with VT)



Three phase 3-wire(2CT) type :
Example of ME110SSR-4AP (with VT)

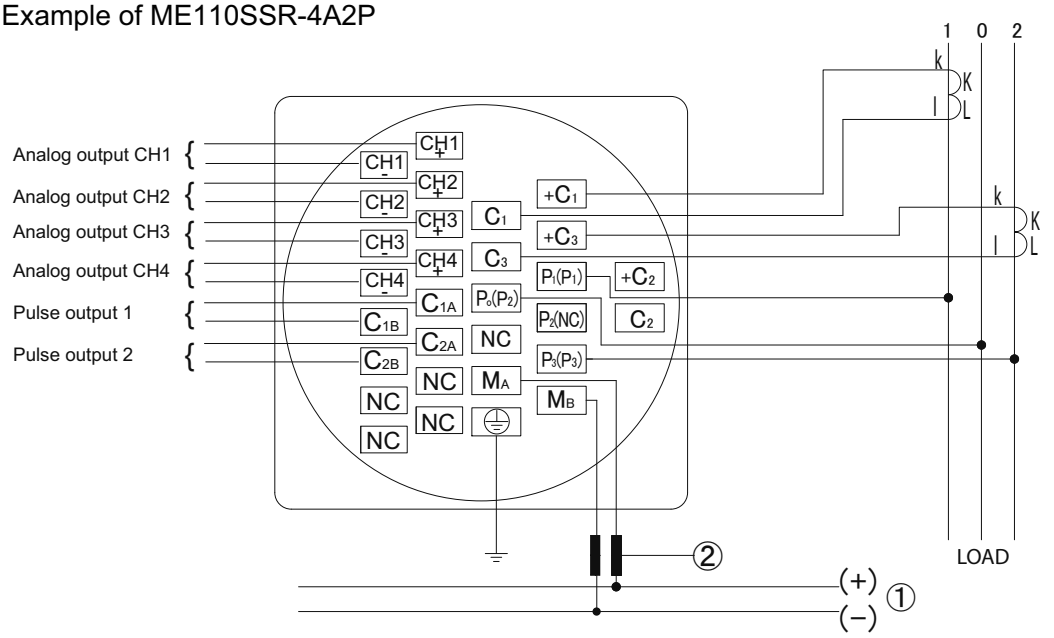


①Auxiliary power supply
AC100-240V or DC100V

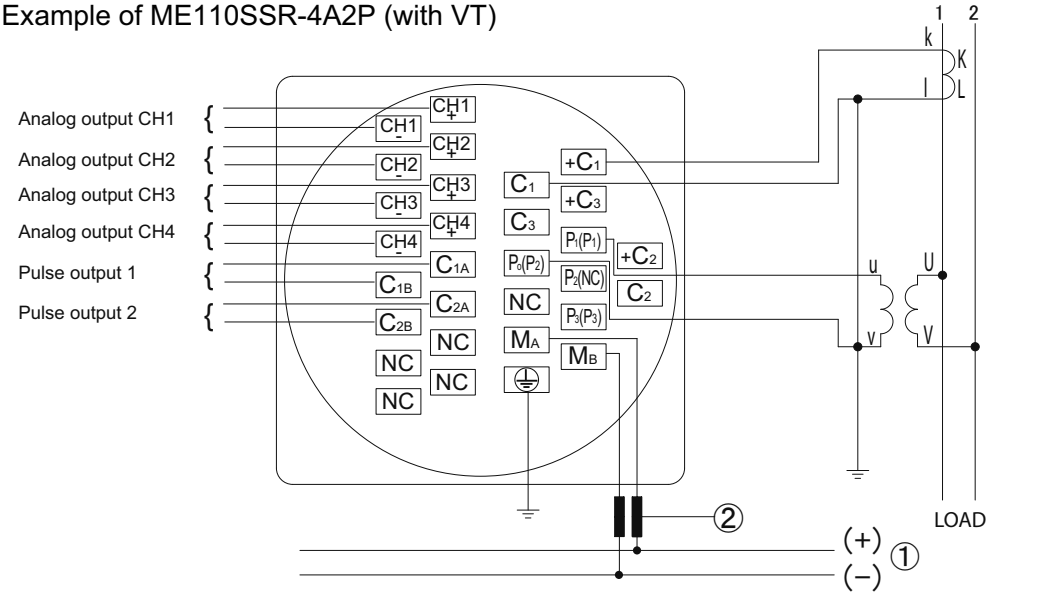
②Fuses gG type(IEC269) or M type rated between 0.5 and 5A
※1: For low voltage circuits,grounding of the secondary side of VT and CT is not necessary.
※2: Do not connect to NC terminal.
※3: The parentheses in the figure indicate that the terminals are for 3P3W, 1P3W, and 1P2W.

Installation 4. Wiring Diagram

Single phase 3-wire type :
Example of ME110SSR-4A2P



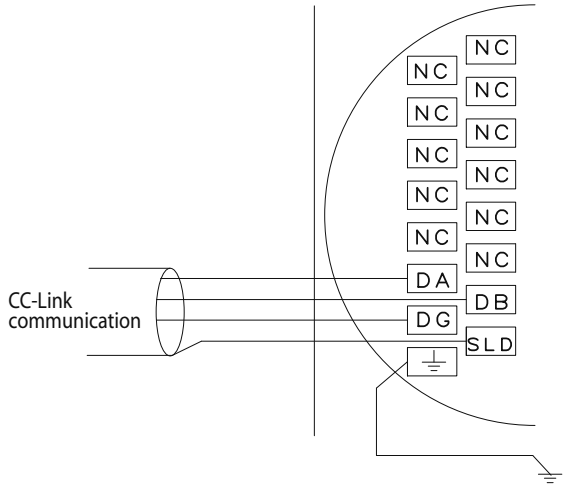
Single phase 2-wire type :
Example of ME110SSR-4A2P (with VT)



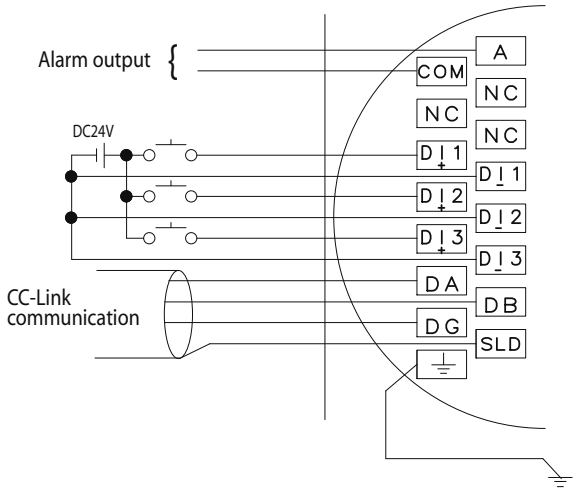
①Auxiliary power supply 100-240 VAC 100 VDC
②Fuses gG type(IEC269) or M type rated between 0.5 and 5A
※1 For low voltage circuits, grounding of the secondary side of VT and CT is not necessary.
※2 Do not connect to NC terminal.
※3 "( )" shows terminal block No. for 3P3W,1P3W,1P2W

Note	1. The voltage input terminals for 3P4W are different from those for others. 2. The output terminal layout is the same regardless of the phase wire method. 3. If the polarity for VT and CT are wrong, measurement cannot be executed correctly. 4. Do not connect wires to the NC terminal. 5. In the case of low voltage, there is no need for grounding of the secondary sides of VT and CT. 6. The output line should not be close to other power lines or input lines (VT, CT, auxiliary power source), and should not be bundled together. Shielded cables and twisted pair lines should be used to avoid noise and surges due to induction. Connection wires should be as short as possible. 7. Always earth the ⏚ terminal to the protective earth conductor. Otherwise there will be a false operation.

Output terminal block of ME110SSR-C

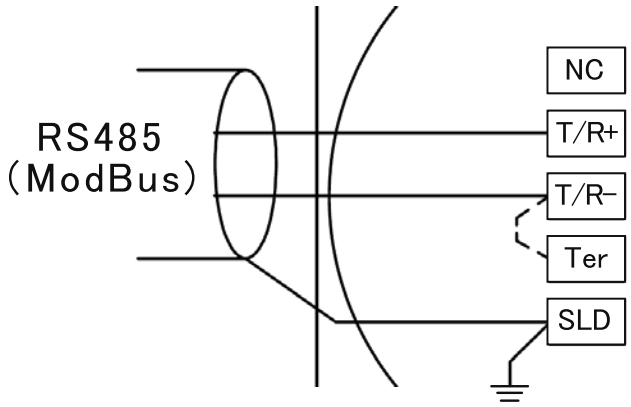


Output terminal block of ME110SSR-CH



Note	1. As for CC-link cable, use the designated cable. (Refer to page 80.) Ver.1.10-compatible CC-Link dedicated cables,CC-Link dedicated cables(Ver.1.00) and CC-Link dedicated high-performance cables cannot be used together.If uesd together, correct data transmission will not be guaranteed.Also attach the terminating resister which matches the kind of the cable. 2. Connect the shielded wire of the CC-Link dedicated cable to “SLD” of each module, and ground both ends of the shielded wire using grounding via “FG” . The SLD and FG are connected within the module. 3. Because the CC-Link transmission line is a small signal circuit, it should be separated from any strong-current circuit by 10cm or more.However,if it is laid paralle for a long distance,it must be laid at least 30cm away. The terminal must be grounded before using. 4. The CC-Link transmission line should use an exclusive line that meets the requirements for total wiring length, distance between stations, and termination resistance values according to the communication speed. If you do not use an exclusive line or observe the wiring requirements, communication may fail. (Refer to the “CC-Link Cable Wiring Manual” about the exclusive line and wiring requirements.) 5. Connect the supplied “terminal resister” to each module at both ends of the CC-Link system. Connect the terminal resistors between “DA” and “DB” .

Output terminal block of ME110SSR-MB



ModBus is the registered trademark of Schneider Automation Inc.

Note	1. Use the shielded twisted pair cable. (Recommended cables: Refer to page 80.) 2. To the units at both ends of the link, the 120-ohm resistance has to be attached. This instrument can perform a 120-ohm termination by short-circuiting the terminal of T/R- and Ter. 3. The earthing has to be connected to earth by a thick wire of low impedance. 4. Keep the distance between Modbus link to power line.

Specifications

Specification

Item			Specification				
Type			ME110SSR,ME110SSR-4AP,ME110SSR-4APH,ME110SSR-4A2P, ME110SSR-C,ME110SSR-CH,ME110SSR-MB				
Phase wire system			Three phase 4-wire(3P4W),Three phase 3-wire(3P3W),Single phase3-wire(1P3W), Single phase 2-wire(1P2W)				
Rating		Current	5AAC , 1AAC (1AAC is special-purpose item)				
		Voltage	3P4W: max277/480VAC 3P3W,1P2W: 110VAC,220VAC 1P3W, 220VAC (110/220VAC)				
		Frequency	50-60Hz				
Measuring Items and accuracy			3P4W	3P3W,1P3W	1P2W	Display	Output
	Current (A)		A1, A2, A3, AN, Aavg	A1, A2, A3	A1	0.5%	0.5%
	Current Demand (DA)		DA1, DA2, DA3, DAN, DAavg	DA1, DA2, DA3	DA1		
	Voltage (V)		V12, V23, V31, Vavg(L-L), V1N, V2N, V3N, Vavg(L-N)	V12, V23, V31	V12		
	Active Power (W)		ΣW, W1, W2, W3	ΣW	ΣW		
	Active Demand Power (DW)		Σ DW, DW1, DW2, DW3	ΣDW	ΣDW		
	Reactive Power (var)		Σ var, var1, var2, var3	Σvar	Σvar		
	Apparent Power (VA)		ΣVA, VA1, VA2, VA3	-	-		
	Power Factor (cosφ)		Σcosφ, cosφ1, cosφ2, cosφ3	Σcosφ	Σcosφ	2.0%	2.0%
	Frequency (Hz)		Hz			0.5%	0.5%
	Active Energy (Wh)		Import, Export			2.0%	2.0%
	Reactive Energy (varh)		Import Capacitive, Import Inductive, Export Capacitive, Export Inductive			2.0%	2.0%
	Harmonics Current (HI)		HI1, HI2, HI3, HIN	HI1,HI3	HI1	2.5%	
			THD, h1...h13 (without even number) RMS value and Distortion ratio (max.100%)			(Total RMS, 0 to Rated x 60%)	
	Harmonics Voltage (HV)		HV1N, HV2N, HV3N	HV12, HV23	HV12	2.5%	
			THD, h1...h13 (without even number) RMS value and Distortion ratio (max.20%)			(THD,0 to 20%)	
Measuring Method	Instantaneous Value		A,V: RMS calculation, W,var,VA,Wh,varh: Digital multiplication, cosφ:Power ratio calculation Hz: Zero-cross, HV,HI: FTT				
	Demand Value		Thermal type calculation				
Display	Type		LCD with backlight				
	Number of display digits		A,DA,V,W,DW,var,VA,cosφ: 4 digits Hz,HI,HV: 3 digits Wh,varh: 6 digits				
	Bar graph		21 Segment-Bar graph, 22 Segment-Indicator				
	Display updating time interval		0.5s / 1s				
Response time			Display: 4s or less, Analog output: 4s or less In HI and HV, 10s or less				
Analog output (ME110SSR-4AP/-4APH/-4A2P)			Range	4~20mA DC			
			Load resistance	600Ω max			
Alarm output (ME110SSR-4APH/-CH)			No-voltage 'a' contact 35VDC, 0.2A				
Pulse output (ME110SSR-4AP/-4APH)			No-voltage 'a' contact 35VDC, 0.1A				
Digital input (ME110SSR-CH)			Rated 24VDC(19 to 30VDC)				
Power Failure Compensation			Non volatile memory (Items: setting value, max/min value, active/reactive energy)				
VA Consumption		VT	0.1VA/phase, 0.2VA/phase (at direct input)				
		CT	0.1VA/phase				
		Auxiliary power	8VA at 110VAC, 9VA at 220VAC, 6W at 100VDC				
		Digital input	DC19-30V, under 7mA				
Auxiliary power			100 to 240VAC (+10%,-15%) 50/60Hz 100VDC (+10%,-30%)				
Weight			0.5kg				
Dimension			110(H)x110(W)x98(D)				
Enclosure			Thermoplastic self-extinguish (UL94V0)				
Operating temperature			-5~50°C (average operating temperature ; 35°C or less per day)				
Operating humidity			85%RHmax, non condensing				
Storage temperature			-20~60°C				
Standard			EMC:EN61326-1:2006 LVD:EN61010-1/2001				

Note1: Accuracy is specified according to the maximum scales value of rated value.
Note2: Measurement of harmonics which its distortion ratio is exceeded 100% may exceed the accuracy.
Note3: Harmonics cannot be measured without voltage input.

Specifications

Communication Specification

ME110SSR-C,ME110SSR-CH

Item	Specifications
CC-Link station type	Remote device station (ver. 1 remote device station or ver. 2 remote device station)
Number of occupied stations	Ver. 1 remote device station (ver. 1 compatible slave station) setting:1 station Ver. 2 remote device station (ver. 2 compatible slave station) setting:1 station (Expanded cyclic setting: Octuple)
CC-Link version	CC-Link Ver 1.10 / 2.00
Transmission speed	Can select from 156 kbps/ 625 kbps/ 2.5 Mbps/ 5 Mbps/ 10 Mbps
Maximum number of connected stations	If the system is configured by only this instrument, up to 42 units can be connected.(note 1)

note1: As for details, refer to the following manuals.

Manual Name	Manual Number (Model Code)
CC-Link System Master/Local Module User's Manual type QJ61BT11N Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the QJ61BT11N. (Optionally available)	SH-080394E (13JR64)

■CC-Link Dedicated Cable

Use the CC-Link dedicated cables for the CC-Link system. If a cable other than the CC-Link dedicated cable is used, the performance of the CC-Link system cannot be guaranteed.
For the specifications of the CC-Link dedicated cables or any other inquiries, visit the following website:
CC-Link Partner Association:http://www.CC-Link.org/

REMARK
For details, refer to the CC-Link cable wiring manual issued by CC-Link PartnerAssociation

■ About Programming
In addition to this manual, read the following documents too.
- Electronic multi-Measuring Instrument programming manual (CC-Link) LAN040503
- Electronic multi-Measuring Instrument programming manual (CC-Link) (For ver.2 remote device station)..... LAN110300

ME110SSR-MB

Item	Specifications
Interface	RS485, 2 wires half duplex
Protocol	ModBus RTU (binary data)
Speed	2400, 4800, 9600, 19200, 38400bps
Distance	1000m
address	1-255
Station number	31
Resistance at end of the link	120Ω 1/2W
Recommended cables	Shielded twisted pair, AWG26 (or wider) gauge

As for details of ModBus communication, refer to "Modbus. org.Website" "Modbus. org.Website": http://www.modbus.org

Set-up Table (Factory Settings and Customer Setting Note)

Set-up menu No.			Set-up item	Initial content	ME110SSR	ME110SSR -4AP	ME110SSR -4APH	ME110SSR -4A2P	ME110SSR -C	ME110SSR -CH	ME110SSR -MB	Customer note
1	1.1		Phase wire system	3P4 (3-phase 4-wire)	○	○	○	○	○	○	○	
	1.2		Display pattern	P04	○	○	○	○	○	○	○	
		1.2.1	Pattern P00	—	○	○	○	○	○	○	○	
	1.3		VT/direct selection	no (No VT)	○	○	○	○	○	○	○	
		1.3.1	Direct voltage	220/380V	○	○	○	○	○	○	○	
		1.3.2	VT secondary voltage	—	○	○	○	○	○	○	○	
		1.3.3	VT primary voltage	—	○	○	○	○	○	○	○	
	1.4		CT primary current	5A	○	○	○	○	○	○	○	
	1.5		Time constant for active power demand	0s	○	○	○	○	○	○	○	
	1.6		Time constant for current demand	0s	○	○	○	○	○	○	○	
2	2.1		Model + Option code	(Model name)	○	○	○	○	○	○	○	
	2.2		Back light brightness	3	○	○	○	○	○	○	○	
	2.3		Backlight auto off	HoLd (continuous on)	○	○	○	○	○	○	○	
	2.4		Display update time	0.5s	○	○	○	○	○	○	○	
3	3.1		Current maximum scale	5A(±0 STEP)	○	○	○	○	○	○	○	
	3.2		Power maximum scale	4kW(±0 STEP)	○	○	○	○	○	○	○	
		3.2.1	Single/Double deflection	Single	○	○	○	○	○	○	○	
		3.2.2	Unit	—	○	○	○	○	○	○	○	
	3.3		Reactive power scale	4kvar(±0 STEP)	○	○	○	○	○	○	○	
		3.3.1	Single/Double deflection	Double	○	○	○	○	○	○	○	
		3.3.2	Unit	—	○	○	○	○	○	○	○	
	3.4		Expanded counting	Combination I	○	○	○	○	○	○	○	
	3.5		Harmonics display	oFF	○	○	○	○	○	○	○	
4	4.1		Index indicator 1	non	○	○	○	○	○	○	○	
		4.1.1	Indicator value 1	—	○	○	○	○	○	○	○	
	4.2		Index indicator 2	non	○	○	○	○	○	○	○	
		4.2.1	Indicator value 2	—	○	○	○	○	○	○	○	
	4.3		Index indicator 3	non	○	○	○	○	○	○	○	
		4.3.1	Indicator value 3	—	○	○	○	○	○	○	○	
	4.4		Index indicator 4	non	○	○	○	○	○	○	○	
		4.4.1	Indicator value 4	—	○	○	○	○	○	○	○	
5	5.1		Alarm item limit item 1	non	○	○	○	○	○	○	○	
		5.1.1	Alarm item limit value 1	—	○	○	○	○	○	○	○	
	5.2		Alarm item limit item 2	non	○	○	○	○	○	○	○	
		5.2.1	Alarm item limit value 2	—	○	○	○	○	○	○	○	
	5.3		Alarm item limit item 3	non	○	○	○	○	○	○	○	
		5.3.1	Alarm item limit value 3	—	○	○	○	○	○	○	○	
	5.4		Alarm item limit item 4	non	○	○	○	○	○	○	○	
		5.4.1	Alarm item limit value 4	—	○	○	○	○	○	○	○	
	5.5		Alarm delay time	—	○	○	○	○	○	○	○	
	5.6		Alarm cancel method	—	○	○	○	○	○	○	○	
	5.7		Back light flickers during alarms	—	○	○	○	○	○	○	○	
	5.8		Motor starting current delay time	oFF	○	○	○	○	○	○	○	
		5.8.1	Motor startup current threshold	—	○	○	○	○	○	○	○	
		5.8.2	Motor startup current	—	○	○	○	○	○	○	○	
6	6.3		Analog output specification	The standard item is 4-20mA and the setting is not necessary.	—	○	○	○	—	—	—	
	6.4		Analog output CH1 output item	A_{AVG}	—	○	○	○	—	—	—	
		6.4.1	Detailed setting (1)	5A(±0 STEP)	—	○	○	○	—	—	—	
		6.4.2	Detailed setting (2)	—	—	○	○	○	—	—	—	
		6.4.3	Detailed setting (3)	—	—	○	○	○	—	—	—	
	6.5		Analog output CH2 output item	$V_{AVG(L-N)}$	—	○	○	○	—	—	—	
		6.5.1	Detailed setting (1)	—	—	○	○	○	—	—	—	
		6.5.2	Detailed setting (2)	—	—	○	○	○	—	—	—	
		6.5.3	Detailed setting (3)	—	—	○	○	○	—	—	—	
	6.6		Analog output CH3 output item	W_{Σ}	—	○	○	○	—	—	—	
		6.6.1	Detailed setting (1)	4kW(±0 STEP)	—	○	○	○	—	—	—	
		6.6.2	Detailed setting (2)	Single deflection	—	○	○	○	—	—	—	
		6.6.3	Detailed setting (3)	—	—	○	○	○	—	—	—	
	6.7		Analog output CH4 output item	$\cos\varphi_{\Sigma}$	—	○	○	○	—	—	—	
		6.7.1	Detailed setting (1)	-0.5-1-0.5	—	○	○	○	—	—	—	
		6.7.2	Detailed setting (2)	—	—	○	○	○	—	—	—	
		6.7.3	Detailed setting (3)	—	—	○	○	○	—	—	—	
	6.8		Analog output limit	oFF	—	○	○	○	—	—	—	
	6.9		Pulse output 1 output item	Active energy (Imported)	—	○	○	○	—	—	—	
		6.9.1	Pulse output 1 pulse unit	0.001kWh/pulse	—	○	○	○	—	—	—	
	6.10		Pulse output 2 output item	Reactive energy (Imported, Lag)	—	—	—	○	—	—	—	
		6.10.1	Pulse output 2 pulse unit	0.001kvarh/pulse	—	—	—	○	—	—	—	
	6.11		Pulse width	0.125s	—	○	○	○	—	—	—	
7	7.2		CC-Link station number	1	—	—	—	—	○	○	—	
		7.2.1	CC-Link baud rate	156kbps	—	—	—	—	○	○	—	
		7.2.2	Power data resolution	tyPE1	—	—	—	—	○	○	—	
		7.2.3	CC-Link version	1.10	—	—	—	—	○	○	—	
	7.4		ModBus address	1	—	—	—	—	—	—	○	
		7.4.1	ModBus baud rate	19.2kbps	—	—	—	—	—	—	○	
		7.4.2	ModBus parity	EVEn(even)	—	—	—	—	—	—	○	
		7.4.3	ModBus stop bit	1	—	—	—	—	—	—	○	
	7.5		Communication reset	—	—	—	—	—	○	—	○	
	7.6		Digital input status	oFF	—	—	—	—	—	○	—	
		7.6.1	Digital input reset method	—	—	—	—	—	—	○	—	
8	8.1		Operation time display	oFF	○	○	○	○	○	○	○	
	8.2		CO_2 emission display	oFF	○	○	○	○	○	○	○	
		8.2.1	CO_2 conversion factor	—	○	○	○	○	○	○	○	
	8.3		Switch element information	123	○	○	○	○	○	○	○	

MITSUBISHI Electronic Multi-Measuring Instrument

Service network

Country / Region	Company	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+61-2-9684-7777
China	Mitsubishi Electric Automation (CHINA) Ltd.	17/F., ChuangXing Financial Center, No.288 West Nanjing Road, Shanghai, 200003	+86-21-2322-3030
China	Mitsubishi Electric Automation (HongKong) Ltd.	10/F., Manulife Tower, 169 Electric Road, North Point, Hong Kong	+852-2887-8810
Europe	Mitsubishi Electric Europe B.V.	Gothaer Strasse 8, D-40880 Ratingen, Germany	+49-(0)2102-486-0
Indonesia	P. T. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+62-(0)21-6610651-9
Korea	Mitsubishi Electric Automation Korea Co., Ltd	1480-6, Gayang-Dong, Gangseo-Gu, Seoul, Korea	+82-2-3660-9572
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon	+961-1-240445
Philippines	Edison Electric Integrated, Inc.	24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines	+63-(0)2-634-8691
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307, Alexandra Road, #05-01/02 Mitsubishi Electric Building, Singapore 159943	+65-6473-2308
South Africa	CBI-electric: low voltage	Private Bag 2016, Isando, 1600, South Africa	+27-(0)11-9282000
Taiwan	Setsuyo Enterprise Co., Ltd	6th Fl., No.105, Wu Kung 3rd, Wu-Ku Hsiang, Taipei, Taiwan, R.O.C.	+886-(0)2-2298-8889
Thailand	United Trading & Import Co., Ltd.	77/12 Bamrungmuang Road, Klong Mahanak, Pomprab Bangkok Thailand	+66-223-4220-3
Vietnam	CTY TNHH-TM SA GIANG	10th Floor, Room 1006-1007, 255 Tran Hung Dao St., Co Giang Ward, Dist 1, Ho Chi Minh City, Vietnam	+84-8-8386727/28/29

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: MITSUBISHI DENKI BLDG., MARUNOUCHI, 2-2-3, CHIYODAKU, TOKYO 100-8310. TELEX: J24532 CABLE: MELCO TOKYO

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